Draft Environmental Impact Statement

Santa Margarita River Flood Control Project
MILCON Project P-010

Basilone Road Bridge Replacement
MILCON Project P-030

Section 404 Clean Water Act
Draft 404 (b) (1) Analysis and Public Interest Review for MILCON Projects P-010 and P-030

United States Marine Corps
Marine Corps Base
Camp Pendleton, California

United States Army Corps of Engineers
Los Angeles District
Los Angeles, California

June 1997

DRAFT
ENVIRONMENTAL IMPACT STATEMENT

SANTA MARGARITA RIVER FLOOD CONTROL PROJECT
MILCON PROJECT P-010
BASILONE ROAD BRIDGE REPLACEMENT
MILCON PROJECT P-030
MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

PREPARED BY:

COMMANDING GENERAL
MARINE CORPS BASE CAMP PENDLETON
U.S. ARMY CORPS OF ENGINEERS

COOPERATING AGENCIES:

U.S. FISH AND WILDLIFE SERVICE
REGIONAL WATER QUALITY CONTROL BOARD

JUNE 1997

COVER SHEET

DRAFT ENVIRONMENTAL IMPACT STATEMENT
SANTA MARGARITA RIVER FLOOD CONTROL PROJECT (P-010),
BASILONE ROAD BRIDGE REPLACEMENT PROJECT (P-030),
AND DRAFT CLEAN WATER ACT 404(b)(1) EVALUATION
CAMP PENDLETON, CALIFORNIA

a. Lead Agency: U. S. Marine Corps: MILCON Projects P-010 and P-030 NEPA Evaluation
U. S. Army Corps of Engineers: Clean Water Act 404(b)(1) Evaluation

b. Cooperating Agency: U.S. Fish and Wildlife Service, San Diego Regional Water Quality Control Board

c. Proposed Action: Construction of flood control improvement structures, stormwater management facilities (MILCON Project P-010), and replacement of Basilone Road Bridge (MILCON Project P-030). Issuance of a permit pursuant to Section 404 of the Clean Water Act to U.S. Marine Corps for discharge of fill into jurisdictional waters of the United States associated with construction and operations of MILCON Projects P-010 and P-030.

d. Inquiries on this document should be directed to:

CDR John L. Snyder (Attn: Vicky K. Taylor)
Southwest Division, Naval Facilities Engineering Command
1220 Pacific Hwy.
San Diego, CA 92132-5190
Phone: (619) 532-3007
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e. Designation: Draft Environmental Impact Statement (DEIS).

f. Abstract: The United States Marine Corps (USMC) proposes to construct a flood control project including a levee and ancillary systems to prevent damage to property and disruption of essential operations at MCB Camp Pendleton and MCAS Camp Pendleton. In addition, the USMC proposes to replace the temporary Basilone Bridge across the Santa Margarita River in the southeast portion of MCB Camp Pendleton. The bridge would need to be able to withstand a flood event of up to 100-years in magnitude. Related to these projects, the U. S. Army Corps of Engineers, Los Angeles District is evaluating the issuance of a permit under Section 404 of the Clean Water Act (33 USC § 1344).

As part of this evaluation, an alternative screening analysis was performed to evaluate the engineering feasibility of alternative structures and facilities for both flood control and bridge replacement. A U.S. Army Corps of Engineers floodplain analysis, a MCB Camp Pendleton traffic engineering study, and other engineering studies identified three feasible flood-control structure alternatives and three feasible bridge replacement alternatives. The Santa Margarita River Flood Control Project includes two components: A flood control structure (a levee) to provide protection to MCAS Camp Pendleton, the Chappo (22) Area, Sewage Treatment Plant No. 3, and the Santa Margarita Ranch House complex from a flood event of up to 100-years in magnitude; and a stormwater management system to direct runoff from MCAS Camp Pendleton and the Chappo (22) Area into the Santa Margarita River without creating a flood hazard. The Basilone Road Bridge Replacement Project includes: replacement of a north-south circulation route across the Santa Margarita River at or in the vicinity of Basilone Road and Vandegrift Boulevard. Potential environmental impacts associated with these actions are considered in the DEIS in the following environmental categories: geology, seismicity, and soils; hydrology and water quality; biological resources; land use; traffic; noise; air quality; cultural resources; aesthetics and visual resources; safety and environmental health; and, environmental justice.

Department of the Navy

Public Hearing for Draft Environmental Impact Statement for the Santa Margarita River Flood Control Project, Basilone Road Bridge Replacement and Section 404 Clean Water Act Draft 404(b)(1) Analysis and Public Interest Review

Pursuant to Council on Environmental Quality regulations (40 CFR parts 1500-1508) implementing procedural provisions of the National Environmental Policy Act, the United States Marine Corps (USMC) has prepared and filed with the U.S. Environmental Protection Agency the Draft Environmental Impact Statement (DEIS) for the Santa Margarita River Flood Control Project, Basilone Road Bridge Replacement and Section 404 Clean Water Act Draft 404(b)(1) Analysis and Public Interest Review.

A public hearing to inform the public of the DEIS findings and to solicit comments will be held on August 13, 1997, beginning at 7:00 pm in the San Raphael Elementary School, located at 1616 San Raphael Avenue, Oceanside, California.

Federal, state, and local agencies and interested parties are invited and urged to be present or represented at the hearings. Oral statements will be heard and transcribed by a stenographer; however, to assure accuracy of the record, all statements should be submitted in writing. All statements, both oral and written, will become part of the public record on this study. Equal weight will be given to both oral and written statements.

In the interest of available time, each speaker will be asked to limit their oral comments to five minutes. If longer statements are to be presented, they should be summarized at the public hearings and submitted in writing either at the hearings or mailed to the address listed at the end of this notice. All written statements must be postmarked by September 5, 1997, to become part of the official record.

The DEIS has been distributed to various Federal, State, and local agencies, elected officials, and civic associations and groups.

In addition, the DEIS has been placed in the following libraries: Fallbrook Public Library, 124 South Mission Road, Fallbrook, CA; Oceanside Public Library, 300 N. Coast Hwy, Oceanside, CA; Temecula Public Library 41000 Country Center Drive, Temecula, CA.

A limited number of single copies are available at the address listed at the end of this notice.

The DEIS addresses the USMC's proposal to construct a flood control project including a levee and ancillary systems to prevent damage to property and disruption of essential operatiions at MCB Camp Pendleton and MCAS Camp Pendleton. In addition, the USMC proposes to replace the temporary Basilone Road Bridge across the Santa Margarita River in the southeast portiion of MCB Camp Pendleton. The levee and bridge would need to be able to withstand a flood event of up to 100-years in magnitude. Related to these projects, the U.S. Army Corps of Engineers, Los Angeles District is evaluating the issuance of a permit under Section 404 of the Clean Water Act (33 USC § 1344).

Additional information concerning this notice may be obtained by contacting:

CDR John L. Snyder (Attn: Vicky K. Taylor)
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1220 Pacific Hwy
San Diego, CA 92132-5190
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Dated: July 18, 1997.

APPENDICES

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

AC/S	Assistant Chief of Staff
ACHP	Advisory Council on Historic Preservation
ACOE	United States Army Corps of Engineers
ADT	Average daily traffic
AFA	Artillery Firing Areas
AFY	Acre-feet per year
AGL	Above ground level
AICUZ	Air Installation Compatible Use Zone
AIRFA	American Indian Religious Freedom Act
ALSF	Airfield Lighting Sequence Flashing
APE	Area of Potential Effect
APZ	Accident Potential Zone
AST	Aboveground storage tank
BA	Biological Assessment
BEQ	Bachelor Enlisted Quarters
bgs	Below ground surface
BP	Before Present
BRAC	Base Realignment and Closure
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CAAQS	California Ambient Air Quality Standards
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CCAA	California Clean Air Act
CCC	California Coastal Commission
CDFG	California Department of Fish and Game
CE	California Endangered Species
CDMG	California Department of Mines and Geology
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response Compensation Liability Act
CFP	California Fully Protected, Fish and Game Code
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Levels
CO	Carbon Monoxide
CSC	California Species of Special Concern
CT	California Threatened Species
CWA	Clean Water Act
dB	Decibel
dBA	A-weighted decibel
DEIS	Draft Environmental Impact Statement
DoD	Department of Defense

ACRONYMS AND ABBREVIATIONS (Continued)

EA	Environmental Assessment
EIS	Environmental Impact Statement
EIRB	Environmental Impact Review Board
EIWG	Environmental Impact Working Group
EO	Executive Order
EPA	United States Environmental Protection Agency
ESQD	Explosive Safety Quantity Distance
FAA	Federal Aviation Administration
FE	Federal Endangered Species
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
FIP	Federal Implementation Plan
FMF	Fleet Marine Force
FMS	Facility Management System
FONSI	Finding of No Significant Impact
FSC	Federal Species of Concern
FSSG	Force Service Support Group
FT	Federal Threatened Species
FY	Fiscal Year
GCA	Ground control approach
gpm	Gallons per minute
GSE	Ground support equipment
ha	Hectares
HEC	Haestead Methods Computer Model
hp	horsepower
Hz	Hertz
I	Interstate
IR	Installation Restoration
LOS	Level of Service
MAG	Marine Aircraft Group
MARDIV	Marine Division
MAW	Marine Air Wing
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MCOP	Marine Corps Environmental Compliance and Protection Manual
MEF	Marine Expeditionary Force
MEU	Marine Expeditionary Unit
mg	Milligram
mgd	Million gallons per day
MILCON	Military Construction
MOA	Memorandum of Agreement
mph	Miles per hour
MSL	Mean sea level

ACRONYMS AND ABBREVIATIONS (Continued)

NAAQS	National Ambient Air Quality Standards
NAF	Naval Air Facility
NAGPRA	Native American Graves Protection and Repatriation Act
NAVAIR	Naval Air Systems Command
NAVFAC	Naval Facilities Engineering Command
NAVSEA	Naval Sea Systems Command
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NOI	Notice of Intent
NO_2	Nitrogen Dioxide
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
O_3	Ozone
Pb	Lead
PES	Potential Explosive Site
PM_{10}	Particulate Matter equal to or less than ten (10) micrometers in diameter
ppm	Parts per million
RCB	Reinforced concrete box
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROI	Region of Influence
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SARA	Superfund Amendments and Reauthorization Act
SCAQMD	South Coast Air Quality Management District
SDAG	San Diego Association of Geologists
SDCAPCD	San Diego County Air Pollution Control District
SDG&E	San Diego Gas and Electric
SDRWQCB	San Diego Regional Water Quality Control Board
SHPO	State Historic Preservation Office
SI	Site Investigation
SIP	State Implementation Plan
SLUCM	Standard Land Use Coding Manual
SALS	Short Approach Landing Systems
SO_2	Sulfur Dioxide
STP	Sewage Treatment Plant
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USMC	United States Marine Corps

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

ES.1 PURPOSE AND NEED

Marine Corps Base (MCB) Camp Pendleton and Marine Corps Air Station (MCAS) Camp Pendleton maintain and operate facilities and provide services to support operations of aviation activities and units of operational forces of the United States Marine Corps (USMC). MCB Camp Pendleton is the USMC's only west coast military installation where a comprehensive air, sea, and ground assault training scenario can be executed. Facilities and operations in the southern portion of MCB Camp Pendleton adjacent to the Santa Margarita River are located in the 100-year floodplain for the river.

Heavy rainfall in 1993 resulted in the flooding of MCAS Camp Pendleton, portions of MCB Camp Pendleton and the destruction of Basilone Road Bridge. The readiness and ability to support the missions of MCB Camp Pendleton and MCAS Camp Pendleton were seriously jeopardized because of the flooding and resulting damage. The flood damage caused operations to cease in the flood damaged areas and reduced the ability of the installation to perform the required missions for a period of 7 months. The flooding threatened the safety of personnel working in a portion of MCB Camp Pendleton and MCAS Camp Pendleton. The flooding also damaged structures and facilities, including buildings in the historic Santa Margarita Ranch House complex, structures in the Chappo (22) Area, and Sewage Treatment Plant (STP) No. 3.

To prevent future damage to property and disruption of essential operations, the MCB Camp Pendleton has proposed construction of a flood control project. The purpose of this project would be to protect USMC assets within the limits of the 100-year floodplain of the Santa Margarita River during a storm event of up to 100 years in magnitude. In addition, the temporary Basilone Road Bridge would be replaced to provide north-south access across the Santa Margarita River in the southeast portion of MCB Camp Pendleton. The bridge would need to be able to withstand a flood event of up to 100 years in magnitude.

ES.2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

As part of the preparation of this Draft Environmental Impact Statement (DEIS), an alternatives screening analysis was performed to evaluate the engineering feasibility of alternative structures and facilities for both the flood control project and replacement of the Basilone Road Bridge. Specifically, the alternatives were evaluated through the application of various siting criteria. The screening process resulted in the selection of several project alternatives for further analysis. A floodplain analysis of the Santa Margarita River was conducted by the U.S. Army Corps of Engineers (ACOE) in 1995 which evaluated onbase flood control alternatives. These onbase flood control alternatives included a concrete lined channel, a soft bottom channel, a floodwall/levee, and

an onbase detention dam. Additional flood control alternatives, including an expanded levee structure, were identified and developed by MCB Camp Pendleton and MCAS Camp Pendleton. A previous evaluation of an offbase dam/reservoir on De Luz Creek was reconsidered. The ACOE floodplain analysis and supporting hydrologic studies identified a levee as the most feasible and least environmentally intrusive flood control method. Three flood-control structure alignment alternatives were identified. A MCB Camp Pendleton transportation planning analysis and other engineering studies resulted in the identification of three bridge replacement alternatives. Other alternatives that were evaluated but eliminated and the rationale for their elimination are also discussed in the DEIS.

The Proposed Action consists of two projects: the Santa Margarita River Flood Control Project, (including a stormwater management system) (P-010) and the Basilone Road Bridge Replacement Project (P-030).

The Santa Margarita River Flood Control Project includes two components:

- A flood control structure (a levee) to provide protection to MCAS Camp Pendleton, the Chappo (22) Area, STP No. 3, and the Santa Margarita Ranch House complex from a flood event of up to 100 years in magnitude; and

- A stormwater management system to direct runoff from MCAS Camp Pendleton and the Chappo (22) Area into the Santa Margarita River without creating a flood hazard.

The Basilone Road Bridge Replacement Project includes:

- Replacement of a north-south circulation route across the Santa Margarita River at or in the vicinity of Basilone Road and Vandegrift Boulevard.

Santa Margarita River Flood Control Project. The two components of the Santa Margarita River Flood Control Project (P-010) are described below:

Flood Control Structure. The flood control structure would function to protect MCAS Camp Pendleton, the Chappo (22) Area, the Santa Margarita Ranch House complex, and STP No. 3 from inundation during flood events on the Santa Margarita River. The flood control structure would provide protection from a storm event of up to a 100-year recurrence interval. Three separate levee alignments have been proposed for this project.

Levee Alignment 3 (Preferred Alternative) - A 14,500-foot-long levee and a 2,300-foot floodwall combination extending from STP No. 3 to just upstream of the Santa Margarita Ranch House complex. With this alignment, minimum airfield safety distances along the length of MCAS Camp

Pendleton would be maintained. The alignment would transition sharply to run parallel to Vandegrift Boulevard downstream of the airfield for approximately 2,300 feet, and finally bump out to protect STP No. 3. The structure type would change from earthen levee to a floodwall along the 2,300-foot run parallel to Vandegrift Boulevard. This alignment would also include an upstream guide vane to the main levee. This vane would improve the hydraulics of the levee structure with respect to the impinging flow, and significantly reduce scour depths at this end of the levee and the need for revetment protection. The guide vane would be constructed in the same manner as the levee and would result in a significantly smaller footprint and less potential impacts to riparian habitat than the training structures proposed with levee alignments 1 and 2.

Levee Alignment 1 - A 16,585-foot-long levee extending from STP No. 3 north to approximately 1,000 feet upstream of the Santa Margarita Ranch House complex. This alternative would include three upstream flow training structures and shaving of the hillside upstream of Basilone Road Bridge. Minimum airfield safety distances along the length of the MCAS Camp Pendleton airfield would be maintained. The levee alignment would be a smooth line between the west end of the airfield and STP No. 3.

Levee Alignment 2 - A 15,200-foot-long levee extending from STP No. 3 to just upstream of the Santa Margarita Ranch House complex. This alternative would not include hillside shaving, but would incorporate six river training structures upstream of Basilone Road Bridge and several structures downstream of Basilone Road. The alignment would be identical to Levee Alignment 1 from STP No. 3 to the downstream side of Basilone Road. Minimum airfield safety distances along the length of the MCAS Camp Pendleton airfield would be maintained.

Stormwater Management System. The purpose of the stormwater management system would be to drain surface runoff that becomes trapped behind the flood control structure. The system would have the capacity to manage runoff from approximately 2,100 acres, including MCAS Camp Pendleton and the Chappo (22) Area. The collected stormwater would be pumped back into the river. The system would be designed to manage a storm event with a duration of up to 24 hours and a recurrence interval of up to 100 years. Two alternative stormwater management systems were identified to accommodate surface runoff requirements. For Levee Alignment 3, an existing inundation area would be used for temporary management and removal of stormwater. The Stormwater Management System for levee alignments 1 and 2 would use the same existing inundation area as Levee Alignment 3, but an additional inundation area would be created behind the levee and used to manage stormwater runoff. The inundation areas used to manage stormwater for levee alignments 1 and 2 would necessitate smaller emergency pumps than those required for Levee Alignment 3.

Basilone Road Bridge Replacement Project. The Basilone Road Bridge replacement project would involve construction of a two-lane bridge over the Santa Margarita River. The bridge would be

constructed to meet engineering standards for transporting military loads, as well as providing surface transportation for other users. The new bridge would allow water flow to pass safely underneath the bridge during a 100-year flood event.

Bridge Alignment A - Existing Alignment of Basilone Road Bridge (Preferred Alternative). With this alternative, the Basilone Road Bridge would be replaced in its existing alignment providing a river channel width of approximately 1,155 feet over the newly constructed levee. The height of the new bridge with traffic would cause an encroachment into the runway approach-departure clearance zone of MCAS Camp Pendleton airfield.

Bridge Alignment B - East Curve Alignment. This alignment would begin at the existing Basilone Road alignment on the north bank of the river and curve to the east to avoid runway approach-departure clearance zone encroachment from traffic on the bridge. Bridge Alignment B would be slightly longer at 1,375 feet.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. With this alternative, a new roadway and bridge alignment would be created about 1,200 feet northeast of the existing alignment and southwest of the existing intersection of Rattlesnake Canyon Road and Vandegrift Boulevard. With this alternative, a 2,000-foot-long bridge would be constructed and 2,500 feet of new roadway would be required on the north bank of the river. Therefore, there are nine separate alternatives that create possible combinations for three alternative levee alignments for the Flood Control Project and three alternative bridge alignments for the Basilone Road Bridge Replacement Project. Names of the alternatives are based on one of three levee alignments (indicated by numbers 1, 2, 3), and one of three bridge alignments (indicated by letters a, b, c). A foldout study guide providing a matrix of all alternatives is located at the end of the document.

ES.3 SCOPE OF THE STUDY

A scoping process for determining the issues to be addressed in the DEIS was initiated when a Notice of Intent (NOI) to prepare an DEIS was published in the *Federal Register* on January 9, 1996. The scoping period started on January 9 and ended on March 10, 1996. A public scoping meeting was held on January 25, 1996, to solicit comments and concerns from the general public on the Proposed Action. Three members of the public attended the scoping meeting. In addition to verbal comments, written comments were received during the scoping period from the following agencies:

- United States Environmental Protection Agency (EPA);
- United States Fish and Wildlife Service (USFWS);
- San Diego County Archaeological Society;
- California Department of Fish and Game;

- Save Our Heritage Organization;
- Regional Water Quality Control Board (RWQCB); and
- Sierra Club - Land Use Committee.

The following issues were identified at the public scoping meeting and through subsequent written correspondence, for inclusion in this DEIS:

- Alternatives to Proposed Action - Include analysis of upstream diversions, temporary storage of flood waters, and alternate designs that would minimize constriction of flood water flow.

- Wetlands - Include impacts to wetlands, and minimize impacts on aquatic ecosystems.

- Water Quality - Include impacts to water quality such as: siltation and turbidity; upstream and downstream river velocity, erosion, and sediment; State of California water quality standards; toxic effluent standards; water management plans; and beneficial uses.

- Biological Resources - Include impacts to fish and wildlife habitat; protected and endangered species; sensitive fish, wildlife, reptile, and amphibian species; and aquatic ecosystem.

- Air Quality - Include impacts on air quality, including an analysis of conformity with the State Implementation Plan (SIP).

- Cultural Resources - Include impacts to prehistoric and historic resources, and important to Native American.

- Hazardous Materials - Include a discussion of hazardous materials used and hazardous waste generated during project construction.

The USMC invited four agencies to act as cooperating agencies related to issues within each agency's jurisdiction. These agencies are:

- EPA;
- ACOE;
- USFWS; and
- RWQCB.

The EPA opted not to participate as a cooperating agency, but continued its participation as a commenting agency. Meetings and consultation with these and other agencies addressed project alternatives and potential issues of concerns.

This DEIS provides environmental information relative to the alternatives that will enable the decision-makers to make environmentally sound decisions prior to project implementation. This DEIS includes an analysis of the potential environmental impacts that may result with the construction, operation, and maintenance of the flood control and bridge replacement projects for the following issues: Geology, Seismicity, and Soils; Hydrology; Biological Resources; Land Use; Traffic; Noise; Air Quality; Cultural Resources; Aesthetics and Visual Resources; Safety and Environmental Health; and Environmental Justice. Cumulative impacts of the Proposed Action and other projects in the vicinity are also addressed in this DEIS.

A public hearing to inform local agencies and interested individuals of the DEIS findings and to solicit comments will be held on August 13, 1997, beginning at 7:00 pm in the San Raphael Elementary School, located at 1616 San Raphael Avenue, Oceanside, California.

ES.4 SUMMARY OF ENVIRONMENTAL IMPACTS

A summary comparison of the potential impacts that may be associated with the Proposed Action and the No Action Alternative along with the required mitigation measures for the Santa Margarita River Flood Control Project (P-010) and for the Basilone Road Bridge Replacement Project (P-030) is presented in Figure ES-1.

Under flood conditions similar to those experienced in 1993, the No Action Alternative would result in potential significant adverse impacts for Hydrology (surface water,water quality), Traffic (Basilone Bridge failure), Cultural Resources (Ranch House complex damage), and Safety and Environmental Health (STP No. 3, drinking water wells, access to emergency services).

All of the project alternatives could result in potential significant impacts to Biological Resources, with the least direct and indirect impacts on biological habitats occurring with Alternative 3A.

All of the project alternatives could result in potential significant impacts on Cultural Resources that would be mitigated below a level of significance through appropriate data recovery.

Significant Aesthetic and Visual Impacts could occur for project alternatives that include Levee Alignment 1 or Bridge Alignment C due to structural intrusions adjacent to the Ranch House Complex.

RESOURCE	No Action Alternative			Alternative 3A			Alternative 3B			Alternative 3C			Alternative 1A			Alternative 1B			Alternative 1C			Alternative 2A			Alternative 2B			Alternative 2C		
ALTERNATIVE	Existing Levee System	Existing Stormwater Management System	Existing Bridge	Levee Alignment 3	Current Detainment Area	Bridge Alignment A	Levee Alignment 3	Current Detainment Area	Bridge Alignment B	Levee Alignment 3	Current Detainment Area	Bridge Alignment C	Levee Alignment 1	Current and West Detainment Areas	Bridge Alignment A	Levee Alignment 1	Current and West Detainment Areas	Bridge Alignment B	Levee Alignment 1	Current and West Detainment Areas	Bridge Alignment C	Levee Alignment 2	Current and West Detainment Areas	Bridge Alignment A	Levee Alignment 2	Current and West Detainment Areas	Bridge Alignment B	Levee Alignment 2	Current and West Detainment Areas	Bridge Alignment C
Geology, Seismicity, Soils	●	●																												
Hydrology and Water Quality																														
Surface Water	●	●	●																											
Water Quality																														
Biological Resources																														
Habitats				●		●	●		●	●		●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●
Sensitive Species				●		●	●		●	●		●	●		●	●		●	●		●	●		●	●		●	●		●
Wetlands				●			●			●		●	●			●	●		●		●	●			●			●		●
Land Use				○		○	○			○			○		○	○			○			○		○	○			○		
Traffic			●																											
Noise																														
Air Quality																														
Cultural Resources																														
Prehistoric Resources				○		○	○		○	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Native American Resources				○		○	○		○	○		○	○		○	○		○	○		○	○		○	○		○	○		○
Historic Resources		●		○		○	○		○	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Aesthetics and Visual Resources												●	●			●			●		●									●
Safety and Environmental Health	●	●				○									○									○						
Environmental Justice																														

No significant impacts
○ Mitigated significant impacts
● Unavoidable adverse impacts

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Figure ES-1 Summary of Potential Significant Environmental Impacts - Santa Margarita River Flood Control Project, MCB Camp Pendleton

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1.0 PURPOSE AND NEED

1.0 PURPOSE AND NEED

This Environmental Impact Statement (EIS) includes an analysis of the potential impacts to the environment that may result from the construction/operation/maintenance of Military Construction (MILCON) Projects P-010, *Santa Margarita River Flood Control*, and P-030, *Basilone Road Bridge Replacement*, at Marine Corps Base (MCB) Camp Pendleton, California. This section includes a discussion of the purpose and need; intergovernmental coordination requirements; the public scoping process; and the scope of environmental review in this EIS.

1.1 PURPOSE AND NEED

1.1.1 Purpose

The United States Marine Corps (USMC) has designed the actions described in this EIS to fulfill two primary purposes at MCB Camp Pendleton. The purpose of the Santa Margarita Flood Control Project is to protect USMC assets and maintain operations to fulfill its military mission within the limits of the 100-year floodplain of the Santa Margarita River, including all of Marine Corps Air Station (MCAS) Camp Pendleton. The purpose of the Basilone Road Bridge Replacement is to provide a permanent north-south access route for military and civilian traffic across the Santa Margarita River in the southeast portion of MCB Camp Pendleton to support the base's operational mission.

Heavy rainfall in 1993 resulted in the flooding of MCAS Camp Pendleton and portions of MCB Camp Pendleton and the destruction of Basilone Road Bridge. The readiness and ability to support the missions of MCB Camp Pendleton and MCAS Camp Pendleton were seriously jeopardized because of the flooding and resulting damage. The flood damage caused operations to cease in the flood damaged areas and reduced the ability of the installation to perform the required missions for a period of 7 months. The flooding threatened the safety of personnel working in this portion of MCB Camp Pendleton and MCAS Camp Pendleton. The flooding also damaged structures and facilities, including buildings in the historic Santa Margarita Ranch House complex, structures in the Chappo (22) Area, and Sewage Treatment Plant (STP) No. 3.

Immediately following the 1993 flood event, temporary repairs to the existing levee were made and a temporary bridge was constructed over the Santa Margarita River at Basilone Road. However, since neither of these temporary structures was designed to withstand flood events of greater than 20-year magnitude, the USMC began a process of engineering, hydrologic and environmental studies that would result in the proposed flood control system and Basilone Road Bridge replacement alternatives evaluated in this Draft EIS.

1.1.2 Need

The existing Basilone Road Bridge is located downstream of a major bend and topographic constriction in the river. The bridge structure, and in particular, the roadway approach, intensify the choking effect. During the 1993 storms, the river flow was stopped by buildup of debris which limited the flow conveyance under the bridge structure. In 1993, a 15-foot (4.6 meters)-high, 5,600-foot (1,707 meters)-long flood control levee was located on the south side of the river along the northeastern edge of the Marine Corps Air Station (MCAS) Camp Pendleton airfield. Water poured through a fissure near the Santa Margarita Ranch House complex and eventually breached the levee. MCAS Camp Pendleton and the Chappo (22) Area were inundated with water and approximately 500,000 cubic yards (382,300 cubic meters) of mud. The estimated peak discharge was 45,000 cubic feet per second (cfs) (1,274 cubic meters per second), approximately a 63-year flood event (U.S. Army Corps of Engineers, 1995).

Damage resulting from the 1993 flood at MCB Camp Pendleton and MCAS Camp Pendleton included the loss of electrical, sewage, and water utilities; exterior and interior damage to a number of structures; damage to the MCAS Camp Pendleton fuel storage area; damage to aircraft runway lighting, runway, and taxiway; damage to a hazardous waste storage site; damage to the crash, fire, and rescue facility; damage to the flight simulator building and simulator; and damage to approximately 50 helicopters. In addition, the Santa Margarita Ranch House chapel was partially destroyed; Sewage Treatment Plant (STP) No. 3 suffered extensive damage; and the Atchison, Topeka and Santa Fe Transcontinental Railroad was destroyed. Emergency repairs were made to the levee following the 1993 flood (U.S. Marine Corps, 1993).

In addition, during the 1993 flood, the 200-foot-long Basilone Road Bridge across the Santa Margarita River was separated from its pylons and pushed into the river. Basilone Road is a key north-south circulation link on MCB Camp Pendleton and provides the only access across the river in this area of the base. A temporary bridge was constructed from railroad cars as an emergency repair following the 1993 flood to continue access between north and south portions of the base. However, the bridge and roadway approaches continue to be a restriction to river flow. Moreover, this bridge is only 24 feet wide, which is a substandard width for highway traffic. The standard width for Basilone Road is 40 feet. The temporary bridge cannot support heavy trucks and equipment; therefore, heavy trucks moving between the north and south portion of MCB Camp Pendleton are currently required to use the Stuart Mesa Road or Interstate 5, a detour of approximately 7 miles or 9 miles respectively to the west (U.S. Marine Corps, 1993).

The readiness and ability to support the missions of MCB Camp Pendleton and MCAS Camp Pendleton were seriously jeopardized because of the flood and resulting damage. The flood damage caused operations to cease in damaged areas, and reduced the ability of the base to perform its

required mission for a period of several months. The flooding threatened the safety of personnel working in a portion of MCB Camp Pendleton and MCAS Camp Pendleton. The flooding also damaged structures within the Santa Margarita Ranch House complex, a National Register of Historic Places (NRHP)-listed property; water wells located in the Santa Margarita River watershed; and STP No. 3. The damage to the producing water wells left the southern portion of the base without potable water, affecting 60 to 70 percent of the total base users, and requiring an emergency source of water to be provided from an offbase source. Public health was jeopardized as a result of the flooding of STP No. 3 when untreated sewage was released and surface water was contaminated.

1.2 BACKGROUND

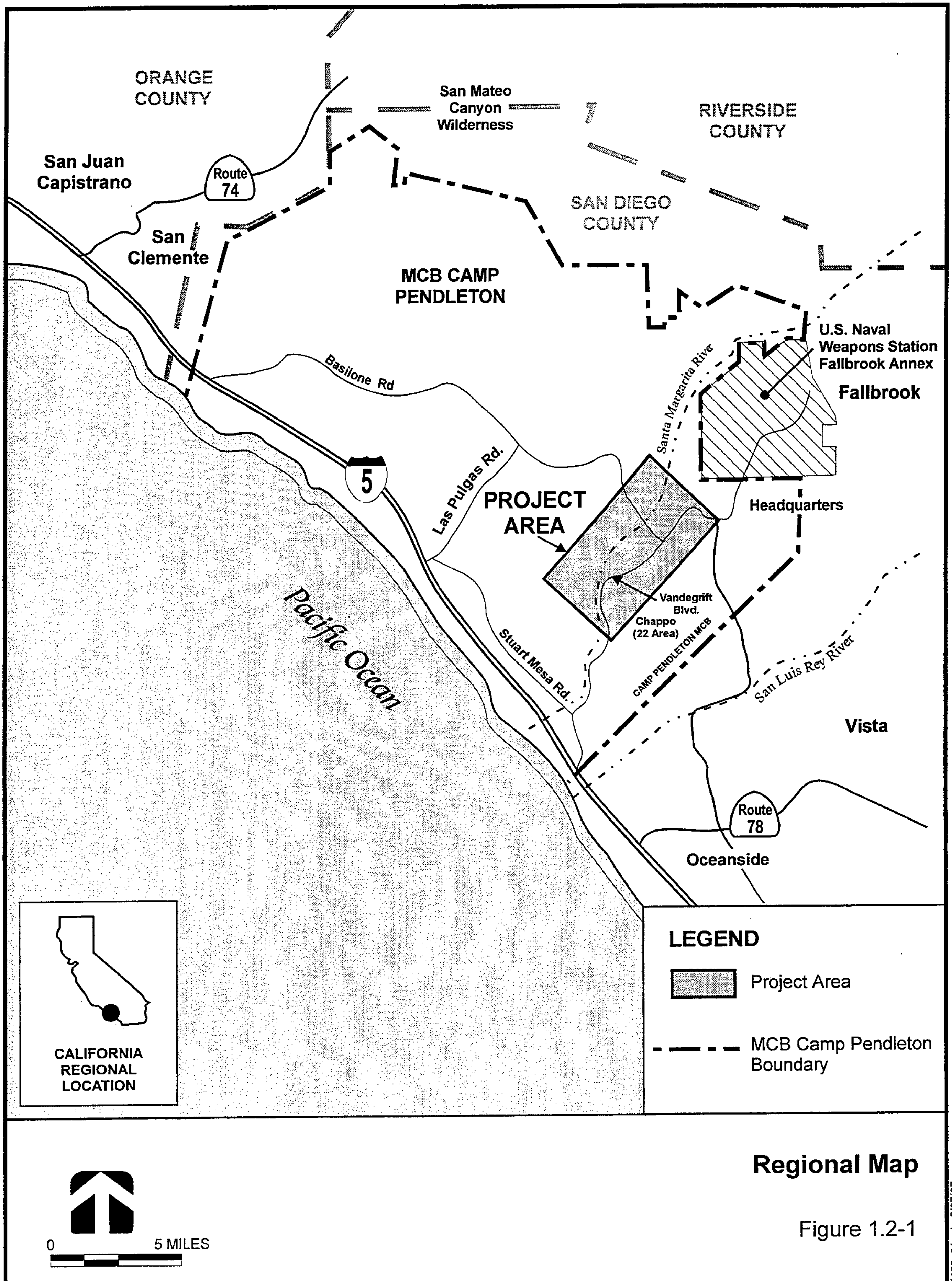
1.2.1 MCB Camp Pendleton and MCAS Camp Pendleton

The missions of MCB Camp Pendleton and MCAS Camp Pendleton are to maintain and operate facilities and provide services to support operations of aviation activities and units of operational forces of the USMC. MCB Camp Pendleton encompasses approximately 200 square miles (518 square kilometers) and is the Marine Corps' amphibious training center for the West Coast. Located in the northwest corner of San Diego County, Camp Pendleton is bounded generally on the north by the City of San Clemente, on the east by the Cleveland National Forest (San Mateo Canyon Wilderness Area) and the unincorporated community of Fallbrook, on the south by the City of Oceanside, and on the west by the Pacific Ocean (Figure 1.2-1).

MCB Camp Pendleton is the Marine Corps' only West Coast military installation where a comprehensive air, sea, and ground assault training scenario can be executed. MCB Camp Pendleton is home to a number of separate commands, including MCB Camp Pendleton (Host); and the major supported commands which include First Marine Expeditionary Force (I MEF), 1st Marine Division (1st MARDIV), and 1st Force Service Support Group (1st FSSG). The I MEF is the command element for the combined Fleet Marine Force (FMF) units, which include 1st MARDIV, 1st FSSG, and 3rd Marine Air Wing (3rd MAW) (based at MCAS, El Toro). MCAS Camp Pendleton supports helicopters and transient aircraft of Marine Air Group 39 (MAG 39), which is a component of 3rd MAW (U.S. Navy, 1992).

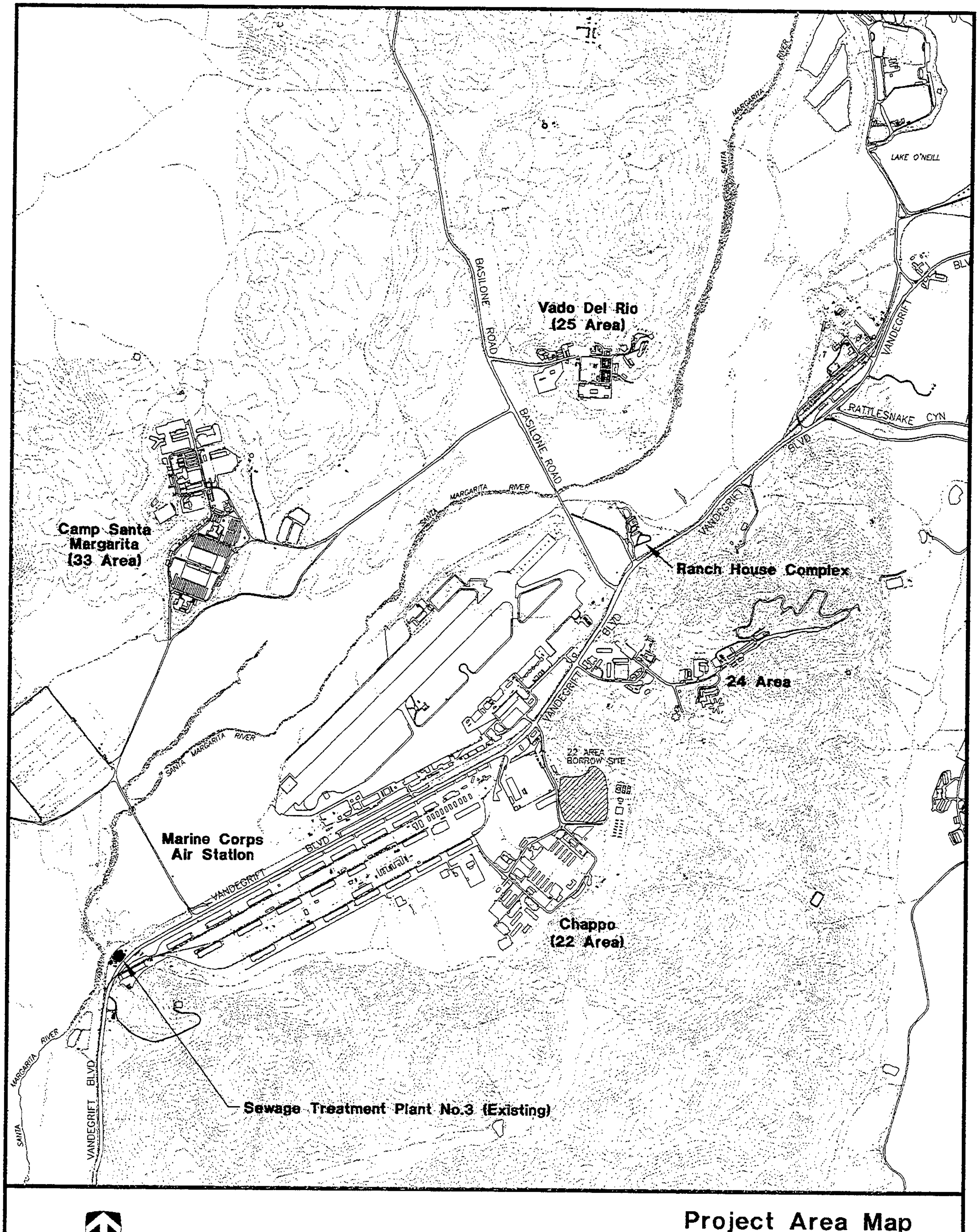
1.2.2 Project Area

Facilities and operations in the southern portion of MCB Camp Pendleton adjacent to the Santa Margarita River are located in the 100-year floodplain for the river (Figure 1.2-2). These facilities include the following:



Regional Map

Figure 1.2-1



Project Area Map

Figure 1.2-2

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- **MCAS Camp Pendleton**. This area includes the runway, associated taxiways, and aircraft parking areas; aircraft maintenance hangars and several smaller maintenance shops; aircraft refueling and defueling facilities; ordnance storage and loading; aircraft engine test cells; a flight simulator building and several training buildings; and various administrative and warehousing buildings. MCAS Camp Pendleton also has water, electrical, sanitary sewer, and communications utilities supported by the MCB Camp Pendleton basewide systems. Several water producing-wells are also located within the boundaries of MCAS Camp Pendleton.

- **Portions of the Chappo (22) Area.** The western half of this area, located south of Vandegrift Boulevard, primarily consists of large warehouse buildings with some administrative and maintenance facilities. The eastern half of the Chappo (22) Area includes operations and training, pistol and rifle ranges (Areas 102 and 103), housing and personnel support (including barracks and a mess hall), and recreation facilities.

- **Portions of the X-Ray Import Area**. This area includes Wilcox Live - Fire Ranges 102 and 103.

- **Sewage Treatment Plant No. 3 and its associated percolation ponds.** This secondary sewage treatment facility receives wastewater flows from the Chappo (22) Area, MCAS Camp Pendleton, the Vado Del Rio (25) Area, the Chappo (24) Area, and the U.S. Naval Hospital, upstream of the Vado Del Rio (25) Area.

- **Portions of the Santa Margarita Ranch House complex.** This 21-acre (8.5 hectares) complex, located northeast of the intersection of Vandegrift Boulevard and Basilone Road, includes three primary buildings (the ranch house, a bunkhouse, and chapel) and four miscellaneous buildings. The Santa Margarita Ranch House complex is the residence of the MCB Camp Pendleton Commanding General and is listed on the NRHP. The ranch house structure itself is not located within the limits of the 100-year floodplain.

- **The northeastern segment of Vandegrift Boulevard and the eastern end of Basilone Road.** Approximately 2.5 miles of Vandegrift Boulevard extending from just south of STP No. 3 to just north of the intersection at Baseline Road lies within the 100-year floodplain. About 1 mile of Basilone Road between Vandegrift Boulevard and Stagecoach Road which interconnects Camp Santa Margarita (33 Area), also lies within the 100-year floodplain.

1.2.3 History of Flood Events

Nine major floods have occurred on the Santa Margarita River since 1916. Prior to 1993, the previous maximum flood event occurred in February 1927, with an estimated peak discharge of 33,600 cubic feet per second. Six major flood events have occurred since MCB Camp Pendleton was established in 1943 (i.e., 1969, 1978, 1980, 1983, 1991, and 1993). Damage to buildings, other structures, roads, and the railroad from the 1978 flood were estimated at $3.8 million, while the 1989 flood resulted in an estimated $6.9 million in damage. The 1993 flood resulted in an estimated $74 million in damage, including more than $20 million in structural and equipment damage and $18 million in aircraft and support equipment damage on MCAS Camp Pendleton (U.S. Marine Corps, 1993).

1.3 INTERGOVERNMENTAL COORDINATION

The USMC is the lead agency for construction of the proposed projects at MCB Camp Pendleton. This EIS has been prepared in accordance with:

- The National Environmental Policy Act (NEPA) of 1969, 42 USC 4321, as amended;
- The Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 Code of Federal Regulations [CFR] 1500-1508);
- The Marine Corps Environmental Compliance and Protection Manual (MCO P5090.2); and
- ACOE implementing regulations for NEPA (33CFR325 Appendix B and 33CFR230).

The USMC invited four agencies to act as cooperating agencies regarding issues related to each agency's jurisdiction. The cooperating agency invitation/response letters are included in Appendix A. Those agencies requested to act as cooperating agencies are:

- EPA;
- ACOE;
- USFWS; and
- RWQCB.

The EPA has chosen not to participate as a cooperating agency, but will participate as a commenting agency.

Construction of the proposed projects would require authorizing actions or permits from various governmental agencies. These permitting issues and authorizing agencies are listed in Table 1.3-1.

1.4 SCOPING PROCESS

The CEQ regulations implementing NEPA require an early and open process for determining the scope of issues to be addressed and for identifying significant issues related to the Proposed Action. Figure 1.4-1 depicts the various components of the scoping process and how they are integrated in the EIS preparation process.

MCB Camp Pendleton initiated the scoping process with the publication of a Notice of Intent (NOI) to prepare an EIS in the *Federal Register* on January 9, 1996. A copy of the NOI and Notice of Public Scoping Meeting were sent to federal, state, and local agencies; other interested parties; radio, television, and print media; and libraries in the vicinity of MCB Camp Pendleton. Advertisements announcing the scoping meeting were placed in several local and regional newspapers and posted on the community calendars of the local cable companies.

The scoping period for this EIS was from January 9 to March 10, 1996. A public scoping meeting was held on January 25, 1996, at San Rafael Elementary School in Oceanside to solicit comments and concerns from the general public on the Proposed Action. Three members of the public attended the scoping meeting. In addition to verbal comments, written comments were received during the scoping period from the following organizations:

- EPA;
- USFWS;
- San Diego County Archaeological Society;
- California Department of Fish and Game;
- Save Our Heritage Organization;
- RWQCB, and;
- Sierra Club - Land Use Committee.

Table 1.3-1

Permitting Issues and Authorizing Agencies

Permitting Issue	Authorizing Agency	Authority	MCB Camp Pendleton Activity
Biological Resources	USFWS Section 7 Consultation	*Endangered Species Act of 1973:* This Act protects listed and proposed threatened or endangered species. Consultation with the USFWS is required under Section 7 of the Act, where actions could directly or indirectly affect any proposed or listed species and habitat designated as critical for that species.	Section 7 consultation with the USFWS was accomplished through the issuance of a Programmatic Biological Opinion in October 1995.
	USFWS	*Migratory Bird Treaty Act:* This Act prohibits killing, harming, or harassing a migratory bird, its eggs, nest, or young.	The Riparian and Estuarine Programmatic Biological Opinion specifies that habitat clearing will be done outside of the breeding season.
		Fish and Wildlife Coordination Act: This Act provides a mechanism for wildlife conservation to receive equal consideration and be coordinated with USFWS.	Continued coordination with USFWS.
Biological Resources/ Water Quality	ACOE	*Clean Water Act (CWA), Section 404:* The ACOE regulates the discharge of dredged or fill material into waters of the United States under the Clean Water Act.	Continue coordination with ACOE throughout project. Obtain a 404 permit from ACOE.
	RWQCB	*CWA Section 401:* To be eligible for the CWA 404 permit, a CWA Section 401 Certification must be obtained from the RWQCB.	Continue coordination with RWQCB throughout project. Obtain 401 Certification from RWQCB.
	EPA	Maintains oversight of water issues related to CWA Sections 402 and 404.	Continue coordination with EPA throughout project and permitting process.
	RWQCB	*CWA Section 402:* States are authorized to administer National Pollutant Discharge Elimination System (NPDES) permits. The objective is to restore and maintain the chemical, physical, and biological integrity of waters of the United States.	Consult with RWQCB and obtain a NPDES permit.

Table 1.3-1, Page 2 of 3

Permitting Issue	Authorizing Agency	Authority	MCB Camp Pendleton Activity
	USMC	*Executive Order 11990* (Protection of Wetlands [1977]): The Order requires federal agencies to follow avoidance/mitigation/preservation procedures with public input before proposing new construction in wetlands.	This EIS and the 404 Permit from the ACOE will meet the compliance with Executive Order (EO) 11990.
	USMC	*Executive Order 11988* (Flood Plain Management [1977]): Requires that all federal agencies take action to reduce the risk of flood loss, to restore and preserve the natural and beneficial values served by flood plains, and to minimize the impact of floods on human safety, health, and welfare.	This EIS and the 404 Permit from the ACOE will meet the compliance with EO 11988.
Cultural Resources	State Historic Preservation Officer (SHPO) and Advisory Council on Historic Preservation	*National Historic Preservation Act of 1966:* This Act provides a broad base for implementing preservation goals and establishes the National Register of Historic Places (National Register) and the Advisory Council on Historic Preservation (ACHP). Section 106 requires that federal agencies consult with the State Historic Preservation Officer and ACHP prior to any undertaking that would affect a property listed on or eligible for the National Register. *Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001 et seq.).* This act establishes provisions for: the identification of tribal and lineal affiliation of Native American human remains and associated funerary objects; requirements for the intentional excavation and removal of Native American human remains and objects from Federal or tribal lands; notification procedures for the inadvertent discovery of Native American human remains and objects; consequences for illegal trafficking in Native American human remains or cultural items; and provisions for inventory, notification, and repatriation of federally held Native American human remains, funerary goods, sacred objects, and objects of cultural patrimony. Consult with the Luiseño as appropriate.	Consult with SHPO regarding eligibility and determination of effects on cultural resources within the area of potential effects (APE) of the project.

Table 1.3-1, Page 3 of 3

Permitting Issue	Authorizing Agency	Authority	MCB Camp Pendleton Activity
Air Quality	San Diego Air Pollution Control District (SDAPCD)	*The Federal Clean Air Act of 1970:* This act, with its subsequent amendments of 1977 and 1990, set forth National Ambient Air Quality Standards (NAAQS) for ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter less than ten microns in diameter (PM_{10}), and lead (Pb). The Act requires individual states and counties to adopt standards which set acceptable pollutant concentrations equal to, or less than, the federal standards.	Obtain SDAPCD operating permit or Certificate of Registration.
		State Implementation Plan (SIP). In areas that exceed the NAAQS (no attainment areas), the Clean Air Act in the implementing regulations of 40 CFR 51 require the state to adopt an SIP, outlining a policy by which affected areas can reduce emissions, improve air quality, and regain attainment status. States, in turn, require affected counties to develop air quality attainment or maintenance plans. The revised SIP for the San Diego Air Basin was submitted to the EPA on 15 November 1994 and is currently under review.	
		Conformity Rule of the Clean Air Act. Conformity is defined in Section 176 of the Act as conformity to the SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards, and that such activities will not: 1) cause or contribute to any new violation of any standard in any area; 2) increase the frequency or severity of any existing violation of any standard in any area; or 3) delay timely attainment of any standard, required interim emission reductions, or milestones in any area.	Conduct applicability/conformity analysis. (See Appendix F)

The following issues were identified at the public scoping meeting and in subsequent written correspondence, for inclusion in the EIS:

- Alternatives to Proposed Action - Include analysis of upstream diversions, temporary storage of flood waters, and alternate designs that would minimize constriction of flood water flow.
- Wetlands - Include impacts to wetlands, and minimize impacts on aquatic ecosystems.
- Water Quality - Include impacts to water quality through; siltation and turbidity; upstream and downstream river velocity, erosion, and sediment; State water quality standards; toxic effluent standards; water management plans; and beneficial uses.
- Biological Resources - Include impacts to fish and wildlife habitat; protected and endangered species; sensitive fish, wildlife, reptile, and amphibian species; and aquatic ecosystem.
- Air Quality - Include impacts on air quality, including an analysis of conformity with the State Implementation Plan (SIP).
- Cultural Resources - Include impacts to prehistoric and historic resources, and features important to Native Americans.
- Hazardous Materials - Include a discussion of hazardous materials used and hazardous waste generated during project construction.

Further meetings and consultation with the cooperating agencies addressed project alternatives and potential issues of concerns. This EIS addresses pertinent issues based upon consultation with cooperating agencies, comments received in response to the NOI, and comments received at the public scoping meeting.

1.5 SCOPE OF ENVIRONMENTAL REVIEW

This EIS provides baseline environmental information relative to the alternatives that will enable the decision-makers to make environmentally sound decisions prior to project implementation. This EIS includes an analysis of the potential environmental impacts that may result from the construction, operation, and maintenance of the flood control (P-010) and bridge replacement (P-030) projects. Section 2.0 of this EIS includes a description of the Proposed Action, alternatives considered, and those eliminated from further consideration. Section 3.0 includes a description of the affected environment, which provides the basis for analyzing the environmental consequences of the project alternatives presented in Section 4.0. The potential environmental consequences and any necessary mitigation measures are analyzed for the following issues: Geology, Seismicity, and Soils; Hydrology and Water Quality; Biological Resources; Land Use; Traffic; Noise; Air Quality; Cultural Resources; Aesthetics and Visual Resources; Safety and Environmental Health; and Environmental Justice.

Cumulative impacts of the Proposed Action and other projects in the vicinity are addressed in Section 5.0, and the irreversible and irretrievable commitment of resources is discussed in Section 6.0. The relationship between short-term use of the environment and maintenance and enhancement of long-term productivity is addressed in Section 7.0. Organizations and persons consulted and references used during the preparation of this EIS are listed in Sections 8.1 and 8.2, respectively. A list of preparers of this EIS is provided in Section 9.0.

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2.0 PROPOSED ACTION AND ALTERNATIVES

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 OVERVIEW

The existing levee extends from east of the Santa Margarita River Ranch House complex downstream for a distance of 5,600 feet (1,707 meters) and was constructed to accommodate up to a 50-year flood event (Graves, 1982). The levee, therefore, provides protection for only the eastern portion of Marine Corps Air Station (MCAS) Camp Pendleton. Portions of the Chappo (22) Area, the Santa Margarita Ranch House complex, and Sewage Treatment Plant (STP) No. 3 and its associated percolation ponds are located in the 50-year floodplain for Santa Margarita River (Graves, 1982). Due to low points in the existing levee, portions of the Santa Margarita Ranch House complex, and portions of MCAS Camp Pendleton are subject to flooding during a 25-year flood event. The existing temporary bridge on Basilone Road was not constructed to withstand any significant flood event.

Based on a series of planning and engineering studies, Marine Corps Base (MCB) Camp Pendleton determined that to prevent flooding of these areas during significant flood events (up to a 100-year flood event), a flood control project would be needed. A floodplain analysis of the Santa Margarita River was conducted by the United States Army Corps of Engineers (ACOE) to evaluate onbase flood control alternatives. These onbase flood control alternatives included a concrete lined channel, a soft bottom channel, a floodwall/levee, and an onbase detention dam. A previous evaluation of an offbase dam/reservoir on De Luz Creek was reconsidered.

MCB Camp Pendleton determined that because access across the Santa Margarita River in this area of the base was necessary to meet the MCB Camp Pendleton and MCAS Camp Pendleton missions and emergency response (e.g., police, fire, and medical) requirements, an improved transportation route across the river was required. Other existing access points across the Santa Margarita River at Interstate 5 and Stuart Mesa Road require a detour of approximately 9 and 7 miles respectively.

MCB Camp Pendleton reviewed the findings of the ACOE floodplain analysis and the previous evaluation of the offbase De Luz Creek dam/reservoir. The review process included evaluating engineering feasibility (hydraulic control, sediment control, channel maintenance, and channel width); MCB Camp Pendleton and MCAS Camp Pendleton operations and mission feasibility (providing flood control to MCB Camp Pendleton and MCAS Camp Pendleton as quickly as possible, and avoiding runway approach-departure clearance zone intrusion); and environmental feasibility (potential impacts to all environmental resources). Based on the MCB Camp Pendleton planning process and the application of selection criteria described in Appendix B, alternatives that would meet the purpose and need of the Proposed Action were identified and evaluated. A description of each alternative that was considered, a summary of the criteria evaluation, and the

results of the criteria evaluation are included in Appendix C. MCB Camp Pendleton determined that the most feasible option to meet the purpose and need was to construct a levee/floodwall and associated stormwater management system, and replace Basilone Road Bridge. The other alternatives were eliminated during the screening process, as summarized in Section 2.4.

Subsequent to this screening process, MCB Camp Pendleton conducted an additional review referred to as value engineering. A team of engineers, environmental scientists, and cost specialists were assembled to review the assumptions used in the screening and pre-engineering process (Value Engineering Team Study, August 1995). From this value engineering process, refinements were proposed to the levee and stormwater management components. Additionally, a bridge connecting Basilone Road with Rattlesnake Canyon Road was identified as an alternative which should be evaluated further for the replacement of Basilone Road Bridge. With this alternative, a crossing of the Santa Margarita River would be constructed just west of the existing Rattlesnake Canyon Road/Vandegrift Boulevard intersection.

Once the initial concept of a levee/floodwall was conceived, but prior to drafting the preliminary design, MCB Camp Pendleton held a series of meetings with the cooperating and commenting agencies to review the proposed project. These discussions resulted in several modifications to the proposed project which were included in the preliminary analysis for the proposed project and the alternatives.

To support the ongoing development of the proposed levee and bridge alternatives, a Hydraulic and Sediment Transport Analysis was conducted to provide information on the system geomorphology and the hydraulic and sediment transport behavior of the Santa Margarita River from De Luz Canyon to the Pacific Ocean under a range of flow conditions (Northwest Hydraulic Consultants, 1997). The analysis included evaluation of a baseline configuration that represents the existing river system, including the existing flood control levee and the existing temporary Basilone Road bridge. Analysis also included evaluation of the existing river system without a bridge at Basilone Road. Three alternative levee configurations were modeled to develop data for assessment of the river systems' sensitivity to the proposed project components.

Modifications were incorporated into the three alternative levee configurations to achieve maximum avoidance of sensitive wildlife habitat and wetlands. They include the addition of a training vane at the upstream end of the levee and removing the need for spur dikes in some of the alternatives. The preferred levee design was also realigned to wrap around the downstream end of MCAS Camp Pendleton, to include a floodwall along the north side of Vandegrift Boulevard.

2.2 DESCRIPTION OF PROPOSED ACTION

The Proposed Action would consist of two projects: the Santa Margarita River Flood Control Project, including a stormwater management system, (P-010), and the Basilone Road Bridge Replacement Project (P-030).

Santa Margarita River Flood Control Project (P-010)

The Santa Margarita River Flood Control Project (P-010) would include two major components: a flood control structure and a stormwater management system. Both components would be required to fulfill the purpose and need of the flood control project.

***Flood Control Structure*.** The flood control structure would function to protect MCAS Camp Pendleton, the Chappo (22) Area, the Santa Margarita Ranch House complex, and STP No. 3 from inundation during flood events in the Santa Margarita River. The flood control structure would provide protection from a storm event of up to a 100-year recurrence interval. The ACOE has determined that the river flow associated with a 100-year flood event is 64,000 cubic feet per second.

***Stormwater Management System*.** During a storm event, stormwater from Chappo (22) Area and MCAS Camp Pendleton would become trapped behind the levee. A Stormwater Management System is required to avoid structural damages to MCAS Camp Pendleton. The Stormwater Management System would collect stormwater trapped behind the levee, transport it to the pump station, and then pump it back out into the river channel. The system would have the capacity to manage runoff from approximately 2,100 acres, including MCAS Camp Pendleton and the Chappo (22) Area. The system would manage a storm event with a duration of up to 24 hours and a recurrence interval of up to 100 years. Total flow through the system would be approximately 1,500 cubic feet per second (cfs).

Basilone Road Bridge Replacement (P-030)

The Basilone Road Bridge replacement project would involve construction of a two-lane bridge over the Santa Margarita River. The bridge would be constructed to meet engineering standards for transporting military loads, as well as for other users. The new bridge would allow water flow to pass safely underneath the bridge during a flood event of up to 100 years in magnitude.

2.3 ALTERNATIVES TO IMPLEMENT THE PROPOSED ACTION

This section describes in detail the alternatives to implementing the Proposed Action. In accordance with the National Environmental Policy Act (NEPA), these represent a range of reasonable alternatives that would meet the purpose and need of the Proposed Action. There are nine separate

alternatives that create possible combinations for three alternative levee alignments for the Flood Control Project and three alternative bridge alignments for the Basilone Road Bridge Replacement Project. For each of the alternatives, a detailed description of the levee alignment and the associated stormwater management components, as well as the bridge alignment is provided. Names of the alternatives are based on one of three levee alignments (indicated by numbers-1, 2, 3), and one of three bridge alignments (indicated by letters - A, B, C). A comparison of the nine alternatives and their related characteristics and requirements is provided in Section 2.5 of this chapter for ease in alternative comparison. A foldout study guide providing a matrix of all alternatives is located at the end of the document. Alternative numbering in this document corresponds with alternative numbering in the hydrology analysis (Northwest Hydraulic Consultants, 1997). Therefore, Alternative 3 is presented first.

2.3.1 Alternative 3A - Preferred Alternative

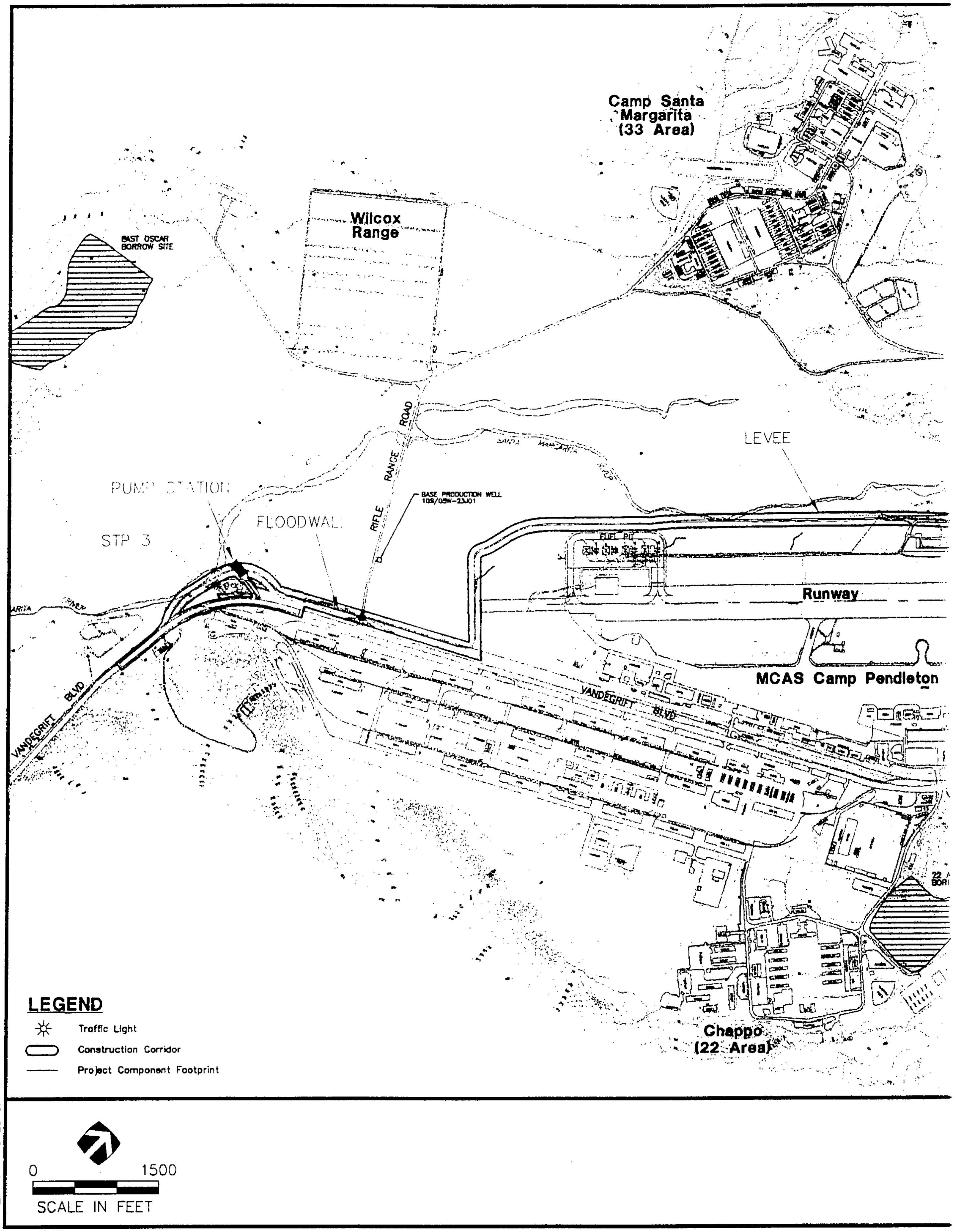
This section describes Levee Alignment 3 and Bridge Alignment A. This alternative is shown in Figure 2.3.1.

2.3.1.1 Levee Alignment 3

Levee Alignment 3 would be approximately 14,500 feet long excluding the floodwall. Levee Alignment 3 would begin at Vandegrift Boulevard north of the Santa Margarita Ranch House complex and wrap around the Santa Margarita Ranch House complex to the existing temporary Basilone Road bridge, following approximately the same alignment as the existing levee. The levee would run along the north border of MCAS Camp Pendleton and would continue to the western extent of the runway clear zone. At the northwest corner of the MCAS Camp Pendleton Clear Zone (Type I), the levee would turn southward, perpendicular to the MCAS Camp Pendleton airfield and continue south to Vandegrift Boulevard. At this point, a 2,300-foot section of the levee would be constructed as a vertical floodwall. It would be built parallel to Vandegrift Boulevard, between 50 and 100 feet from the edge of Vandegrift Boulevard. At STP No. 3, the levee would encircle the plant and then tie into existing grade at Vandegrift Boulevard.

With this alternative, the majority of the levee would be constructed with side slopes of 1:1 (1 foot of rise for every 1 foot of base) utilizing soil cement facing with and without mechanically reinforced earth (Figure 2.3-2). The mechanically reinforced earth levee would reduce the footprint of the levee and the quantity of fill and soil cement needed to construct the levee.

Fill material for the levee would come from material excavated for a windrow revetment, demolition of the existing levee, and from one onbase borrow site. The existing borrow site is in the Chappo (22) Area.



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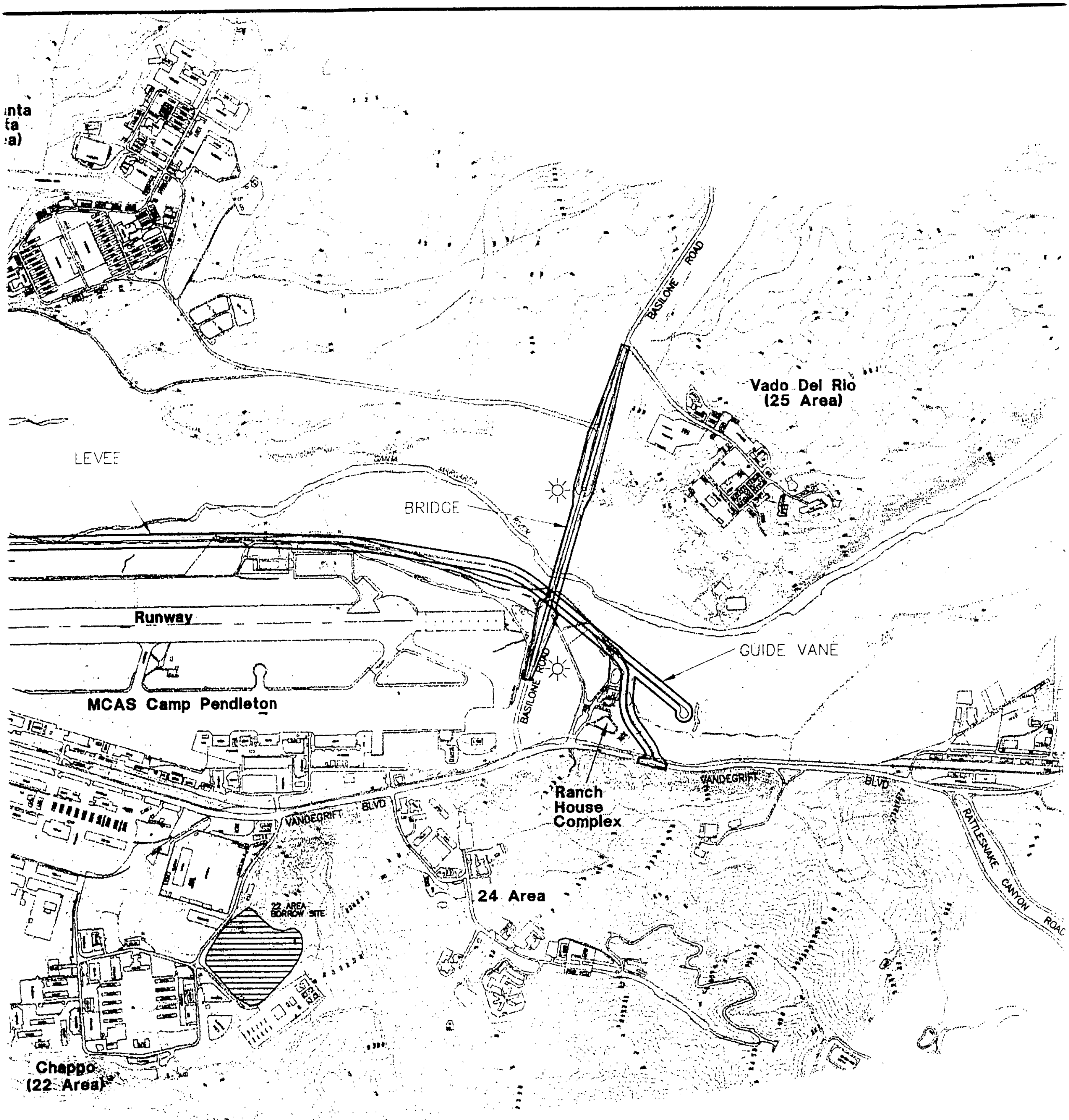

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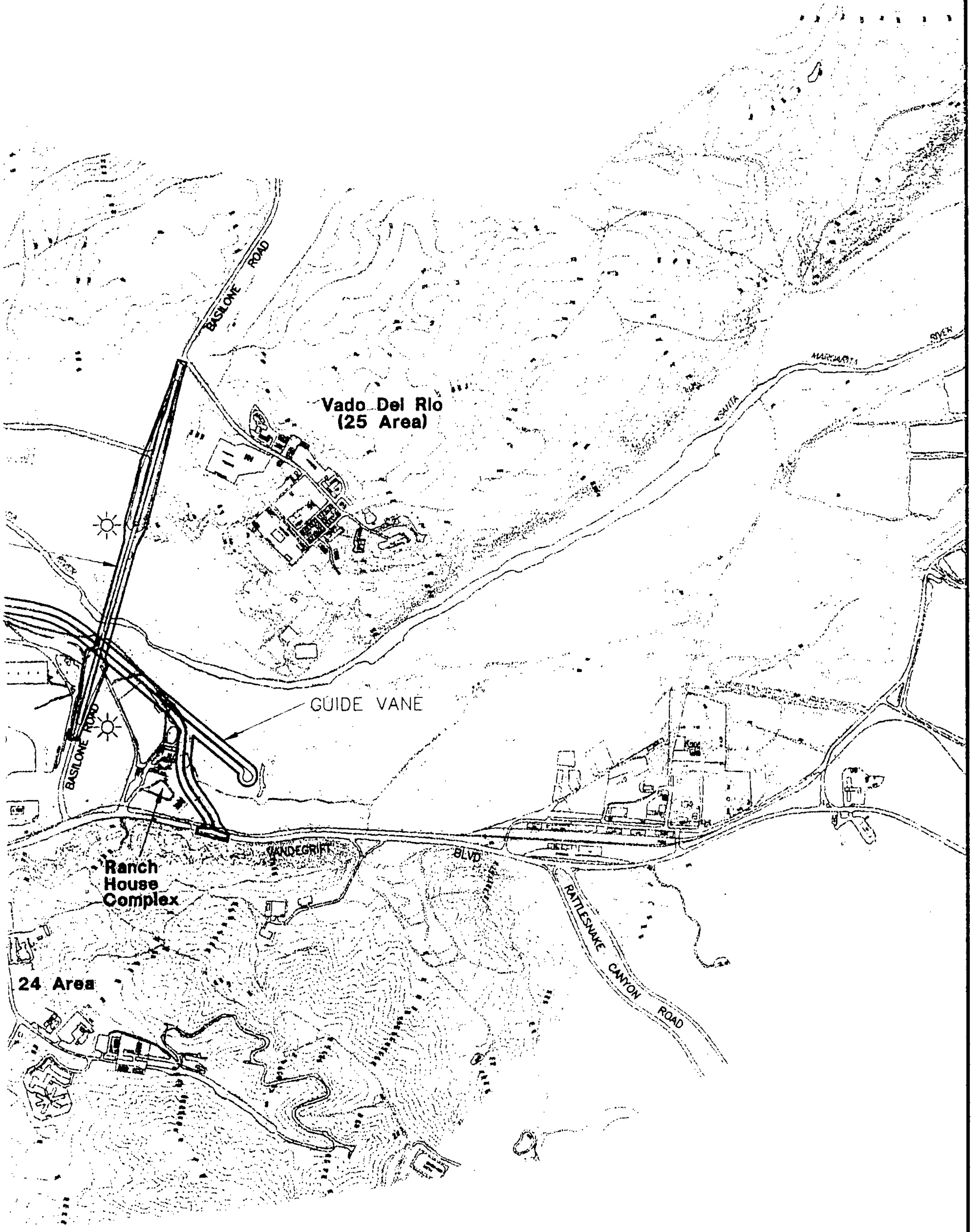
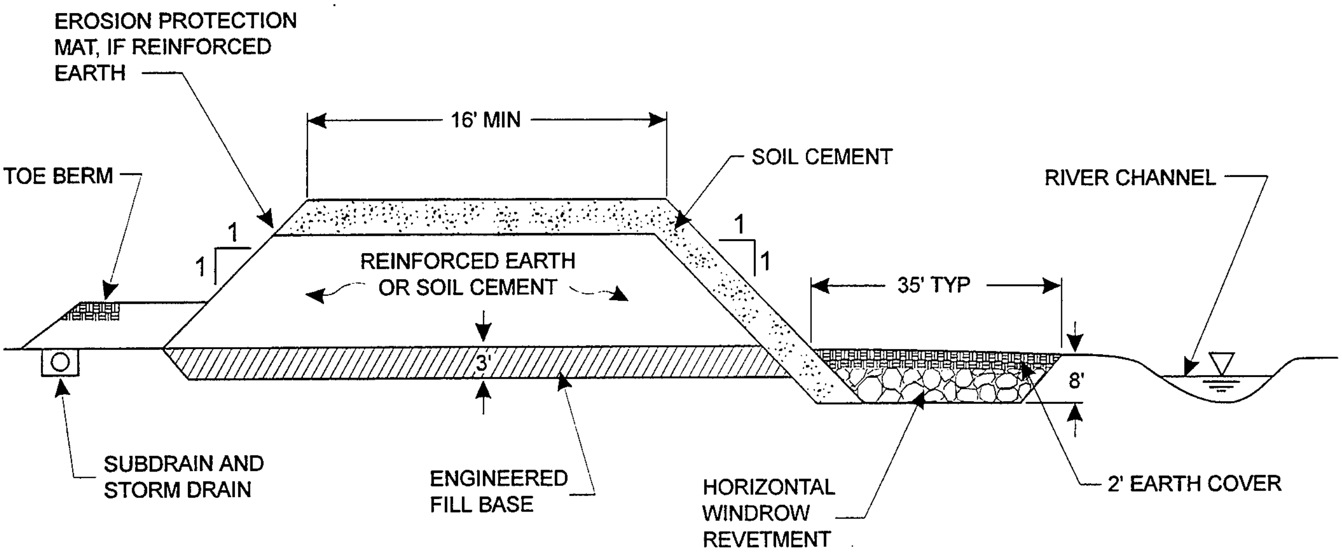
:a)
LEVEE
BRIDGE
BASILONE ROAD
Vado Del Rio
(25 Area)
Runway
GUIDE VANE
MCAS Camp Pendleton
Ranch
House
Complex
VANDEGRIFT BLVD
24 Area
22 AREA
BORROW SITE
RATTLESNAKE CANYON ROAD
Chappo
(22 Area)

Pref

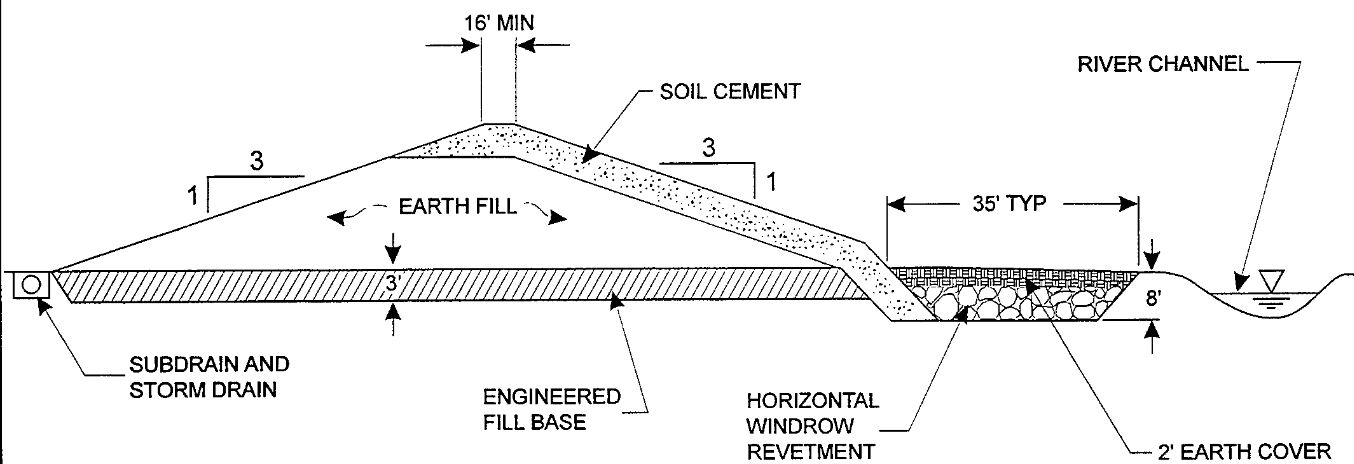


Alternative 3A
Preferred Alternative

Figure 2.3-1



TYPICAL CROSS-SECTION
LEVEE ALIGNMENTS 2 AND 3



TYPICAL CROSS-SECTION
LEVEE ALIGNMENT 1

Typical Cross-Section Views of Alternative Levee Alignments

Figure 2.3-2

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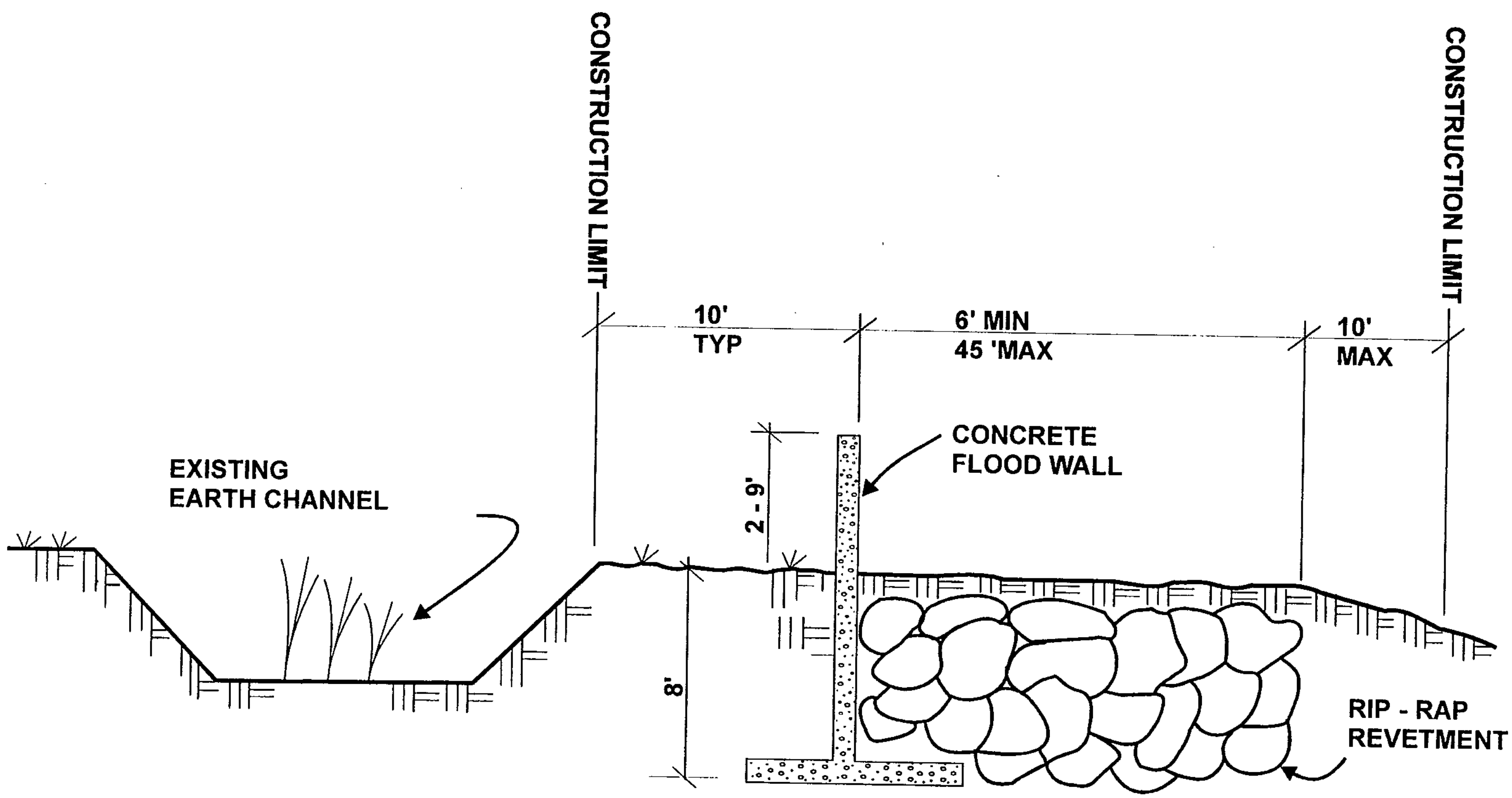
Levee height would vary from 7 feet to 21 feet based on the predicted 100 year flood contours. A minimum of 3 feet of excavation and replacement with engineered fill would provide a base for the levee. A service road would run along the top of the levee for its entire length. A batch plant would be co-located within the Chappo (22) Area borrow site. The batch plant would encompass approximately 1 acre and would produce soil cement for the levee. After construction, the borrow site and associated batch plant would be restored to natural conditions. During construction of the pump station, the very west end of the Chappo (22) Area would be used as a staging area. All staging would remain on the existing pavement. There would be no additional disturbance.

The levee would incorporate several scour protection mechanisms on the outboard (facing the river) side of the levee. A horizontal windrow revetment would be utilized to protect against undermining scour. The windrow revetment would be typically about 8 feet deep and 3 feet wide. The extent of the windrow revetment was determined by an analysis of water velocity and scour potential utilizing hydraulic and sediment transport analysis. The outboard side of the levee would be protected by a soil cement facing. Soil cement would be produced at a batch plant located within the Chappo (22) Area borrow site, using material from the subexcavation and windrow revetment construction. Cement would be imported from an offsite supplier.

The inboard (facing MCAS Camp Pendleton and MCB Camp Pendleton) side of the levee would be faced with slope erosion protection mat or soil cement. To relieve water pressure that would otherwise result in "sand boiling", the inboard side of the levee would include a 9-foot-wide by 3-foot-high toe berm and a subdrain pipe that would run the full length of the levee.

The width of the levee structure would vary depending on the height of the levee. A 150-foot construction corridor roughly centered on the levee alignment would be required, except in several isolated locations where construction would require temporary relocation of the current active river channel through a diversion structure. An example of such a diversion structure entails one known location where the new levee would be located in the current low flow river channel. To construct the levee, the low flow channel would need to be temporarily relocated. This could be accomplished by excavating a new low flow channel (approximately 60 feet wide and 6 feet deep) and temporarily filling in the existing channel. Upon completion of the levee construction, the temporary fill would be removed and the channel allowed to return as closely to its original location to the extent that the new levee construction allows.

A reinforced concrete flood wall would be constructed between the existing earthen channel adjacent to Vandegrift Boulevard and the existing railroad grade. The arrangement and extent of this structure is shown in Figure 2.3-3. It would be approximately 2,300 feet long. The limits of construction would be from the top of the outside edge of the earth channel to a maximum of about 55 feet from the outside face of the wall. The existing earth channel would be protected from virtually all



FLOODWALL "B"

Cross-Section of Floodwall

Figure 2.3-3

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temporary and permanent impacts. The impacts to the area outboard of the flood wall would be minimized by locating the flood wall as close as possible to the earthen channel.

Approximately 16,000 cubic yards of material would be excavated to construct the wall and to place the rock revetment. About 2,500 cubic yards of material would be replaced as backfill around the wall. The balance would be hauled and used to construct the levee, requiring about 300 truck trips of less than 1 mile each way.

Cast-in-place concrete would be used to construct the flood wall. About 1,600 cubic yards of concrete (about 80 trucks) would be required, with 100 tons of reinforcing steel (about 5 trucks). The rock revetment would be placed in the outboard excavation. The revetment would extend from 6 feet long minimum (approximately from the upstream junction with the levee to Rifle Range Road) to 45 feet long maximum (from Rifle Range Road to the downstream junction with the levee). The revetment would be covered with about 2 feet of earth, which, along with the wall backfill, would be replanted with native vegetation.

Access to water well number 9 (IR Program Well Number 10S/05W-23J01), which is located in the Santa Margarita River channel, from Vandegrift Boulevard along Rifle Range Road would be maintained by construction of a ramp over the floodwall. Culverts would be installed at the existing dirt channel crossing.

During construction of the outboard side of the levee, Rifle Range Road would be used as access. Rifle Range Road would be resurfaced, and arundo would be cut back 10 feet on each side of the road. The road would not be widened. Multiple culverts would be installed for clearance at the river crossing. After construction of the levee, current water lines located under Rifle Range Road would be replaced to provide scour protection. These waterlines would be replaced using directional bore installation techniques. Those waterlines in the commercial vicinity of the floodwall at Vandegrift Boulevard And Rifle Range Road will be replaced by an open trench. After all construction activities, the surface of Rifle Range Road would be ripped, disced, seeded, and restored to natural conditions.

River Guiding Structure. Levee Alignment 3 would incorporate a guide vane near the upstream end as part of the levee structure itself (Figure 2.3-1). This vane feature, extending upstream of the main levee, would act to guide the flow between the levee and the canyon wall, while providing a dead water zone adjacent to the Santa Margarita Ranch House complex during high flows. The upstream nose of the extended vane would receive the brunt of the scour likely to occur as flow is forced to change direction. The guide vane would also provide an additional factor of safety to the main levee. Drain pipes would be added to the guide vane to allow the "dead" water to return to the main river channel.

2.3.1.2 Stormwater Management System

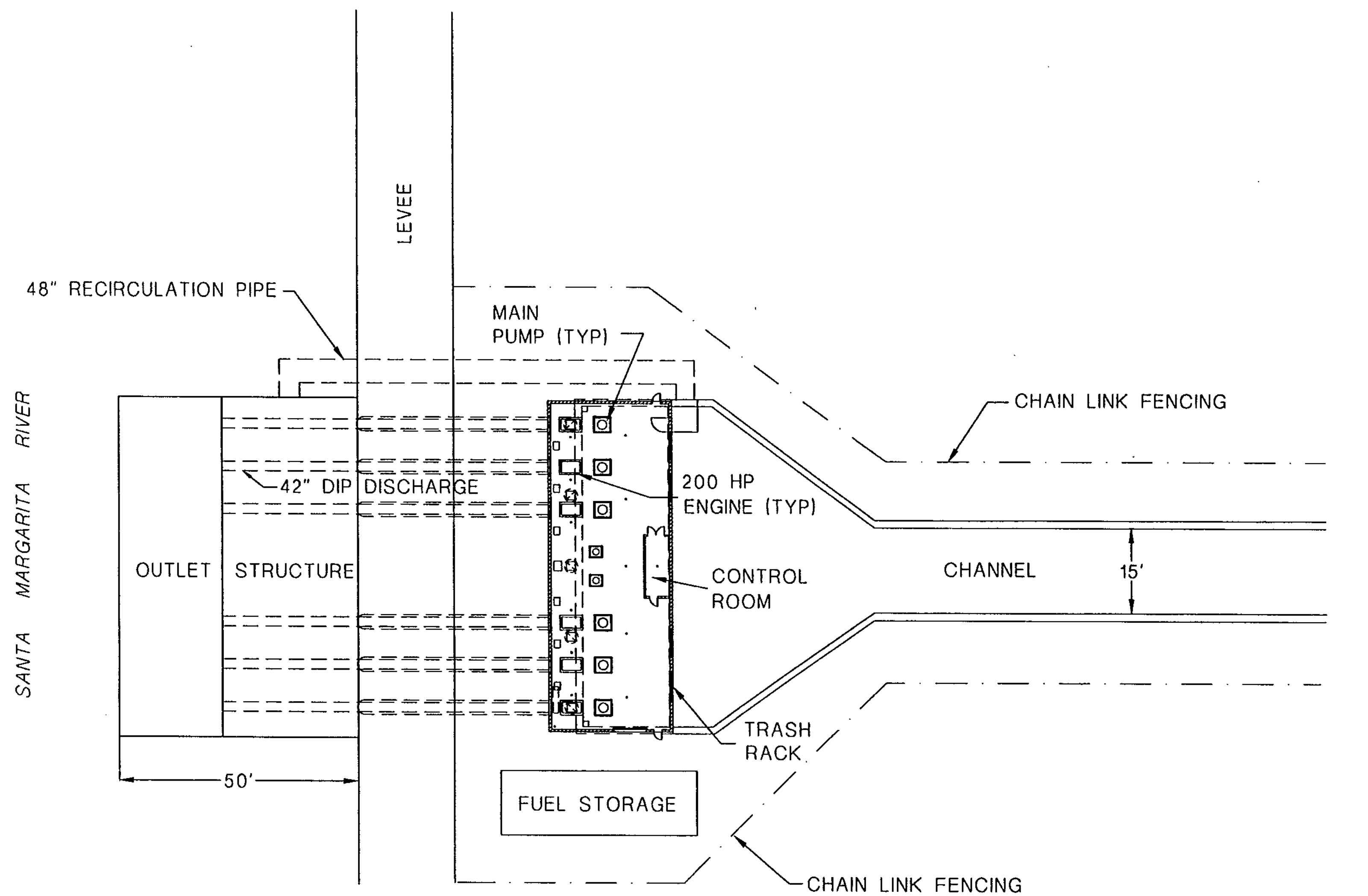
The Stormwater Management System for Levee Alignment 3 would manage storm water drainage entering the system from the existing earthen ditch parallel to Vandegrift Boulevard, and the existing culverts underneath Vandegrift Boulevard which collect runoff from the Chappo (22) Area. The storm drainage entering the system would be collected and discharged into the Santa Margarita River through a pump station. The size of the existing culverts underneath Vandegrift Boulevard would limit the rate at which some of the storm water would enter the system. The required peak pump station capacity would be about 1,000 cfs.

The pump station would consist of a 20-foot-wide concrete approach channel. Two, 200-horsepower (hp), electric-driven main duty pumps would be utilized to manage all normal runoff, without the need to use the emergency pumps. Five, 400-hp, diesel-fired emergency pumps would be available for use in an unforeseen flood situation. A sixth, 400-hp, diesel-fired emergency pump would be available to provide standby service in the event of failure of one of the other emergency pumps during an unforeseen flood situation. The emergency pumps could be used in various combinations depending upon inlet flow conditions and river stage during a flood. All pumps would be equipped with the best available exhaust control system and silencers. The pumps would be housed within a concrete or concrete masonry unit building. The building floor plan would include a pump room and an electrical control room. The building footprint would be 35 feet by 80 feet. The building would be 20 feet tall. Enough diesel fuel for 10 days would be stored in a 10,000-gallon, aboveground, double-walled steel storage tank. Figures 2.3-4 and 2.3-5 show the pump station in plan view (Winzler & Kelly, 1996).

2.3.1.3 Bridge Alignment A - Existing Basilone Road Bridge Alignment

This alignment would follow the existing bridge alignment and would be constructed with six piers. The bridge would be constructed in seven sections or bents and is a prestressed, concrete structure with single column support on a pile foundation to provide a river channel width of approximately 1,155 feet. The span length between bents would be 765 feet. The depth of the box girder would be 5 feet. The deck of the bridge would be 43.5 feet wide, which would allow for a road width of 40 feet. The bridge would be 6 feet deep. The bridge would be designed to meet engineering standards for transporting heavy military loads as well as other users.

The bridge would span the flood control structure, while maintaining at least a 1-foot clearance from the bottom of the bridge to the top of the levee. As a result, roadway and approach fills on the north and south sides of the river would be required to accommodate the elevation of the bridge. The south approach would be approximately 1,500 feet long, with the bridge located 11 feet above existing grade. The north approach would be 1,650 feet long, with the bridge located 12 feet above the existing grade of Basilone Road.



Source: Winzler & Kelly, July 1996 (Rev. June 1997)

Stormwater Management System
Pump Station - Plan View

Figure 2.3-4

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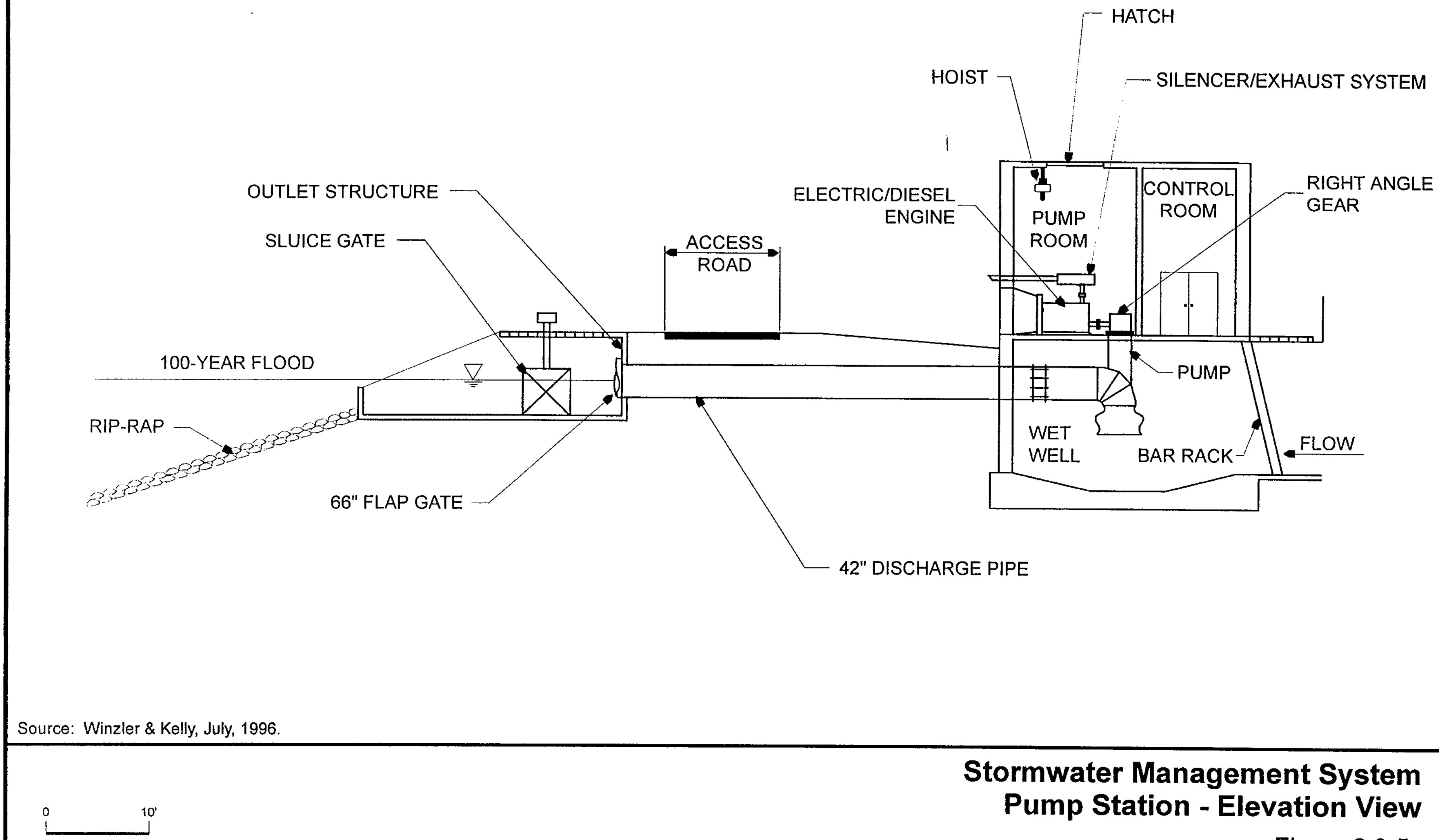

Source: Winzler & Kelly, July, 1996.

Stormwater Management System
Pump Station - Elevation View

Figure 2.3-5

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As a result of the height increase, traffic on the bridge would encroach slightly into the MCAS Camp Pendleton Approach-Departure Clearance Surface, an imaginary conical surface that reflects the takeoff and landing patterns of certain aircraft using the MCAS Camp Pendleton airfield (Section 3.10.1). This alignment would incorporate a standard traffic light controlled by the MCAS Camp Pendleton Air Traffic Control Tower to stop vehicles during takeoff and landing of aircraft that use the full reach of the Approach-Departure Clearance Surface.

One or two excavations for the bridge support bents may be located in the low flow channel during construction. In order to excavate the foundations for these bents, sheet piles will be driven. The sheet piles will enclose an area approximately 16 feet wide by 35 feet long. The tops of these sheet piles will extend above the water surface elevation to prevent surface water from entering the excavations. These sheet piles will temporarily divert the river flow around the excavation until construction of the foundations is completed. After the foundations are backfilled, the low flow channel would return to its original location, to the extent that the new bridge support piers will allow.

During construction of the bridge, Rifle Range Road would be used as north-south access. Some traffic would be diverted to Stuart Mesa and Las Pulgas Road (see Figure 1.2-1). Military police and signage would be utilized for traffic control.

A batch plant would be co-located within the Chappo (22) Area borrow site. The batch plant would encompass approximately 1 acre, and would produce cement for the bridge. After construction, the borrow site and associated batch plant would be restored to natural conditions. During construction of the bridge, the existing Basilone Roadway would be used as a staging area. There would be no additional disturbance associated with this staging area.

2.3.1.4 Construction Requirements

Both the Flood Control Project (P-010) and the Basilone Road Bridge Replacement Project (P-030) are proposed construction projects. As such, the construction requirements in terms of materials and construction activities for moving and using those materials would be the primary source of direct impacts resulting from the projects. The following discussion summarizes the estimated construction earthwork, trip generation, and work required to build this alternative.

Earthwork Requirements. Levee Alignment 3 would require a total of about 530,000 cubic yards of material to be moved. In addition, Bridge Alignment A would require 64,000 cubic yards of material to construct the roadway approaches. This material would come from demolition of the existing levee, excavation of the windrow revetment for the new levee, and the Chappo (22) Area borrow site (Figure 2.3-1).

Trip Generation. Movement of materials and workers would be one of the primary sources of environmental impacts during construction, especially traffic, air quality, noise and biological impacts. These trips would involve earth moving equipment such as scrapers and loaders, and larger trucks to deliver cement, concrete, steel, rocks, and pilings to the construction sites. Table 2.3.1-1 summarizes the total trips for Alternative 3A by type of construction activity.

Table 2.3.1-1

Alternative 3A
Construction Trips by Operation

Operation	Number of Trips
Fill material movement for levee and bridge approaches	32,090
Imported rock for levee and bridge slope protection (from Oceanside)	6,300
Onsite rock movement	1,890
Imported cement for soil cement levee face (from Oceanside)	1,190
Imported aggregate base and paving for levee road and bridge (from Oceanside)	3,780
Delivery of steel and pilings for floodwall and bridge	120
Concrete movement for floodwall and bridge	1,030
Total Trips:	**46,400**

Construction Workers. The number of construction workers on the site would vary depending on the operations being performed. At the peak of construction, there would be up to 150 workers for both the levee and bridge projects.

2.3.2 Alternative 3B

This section describes Levee Alignment 3 and Bridge Alignment B. This alternative is shown in Figure 2.3-6.

2.3.2.1 Levee Alignment 3

The levee alignment for Alternative 3B would be the same as with Alternative 3A, including the stormwater management system (Section 2.3.1.1).

2.3.2.2 Bridge Alignment B - East Curve Alignment

This alignment would avoid runway approach-departure clearance zone intrusion and the need for a traffic light by relocating the south roadway approach to Basilone Road Bridge out of the MCAS Camp Pendleton Approach-Departure Clearance Surface for the airfield runway. The proposed

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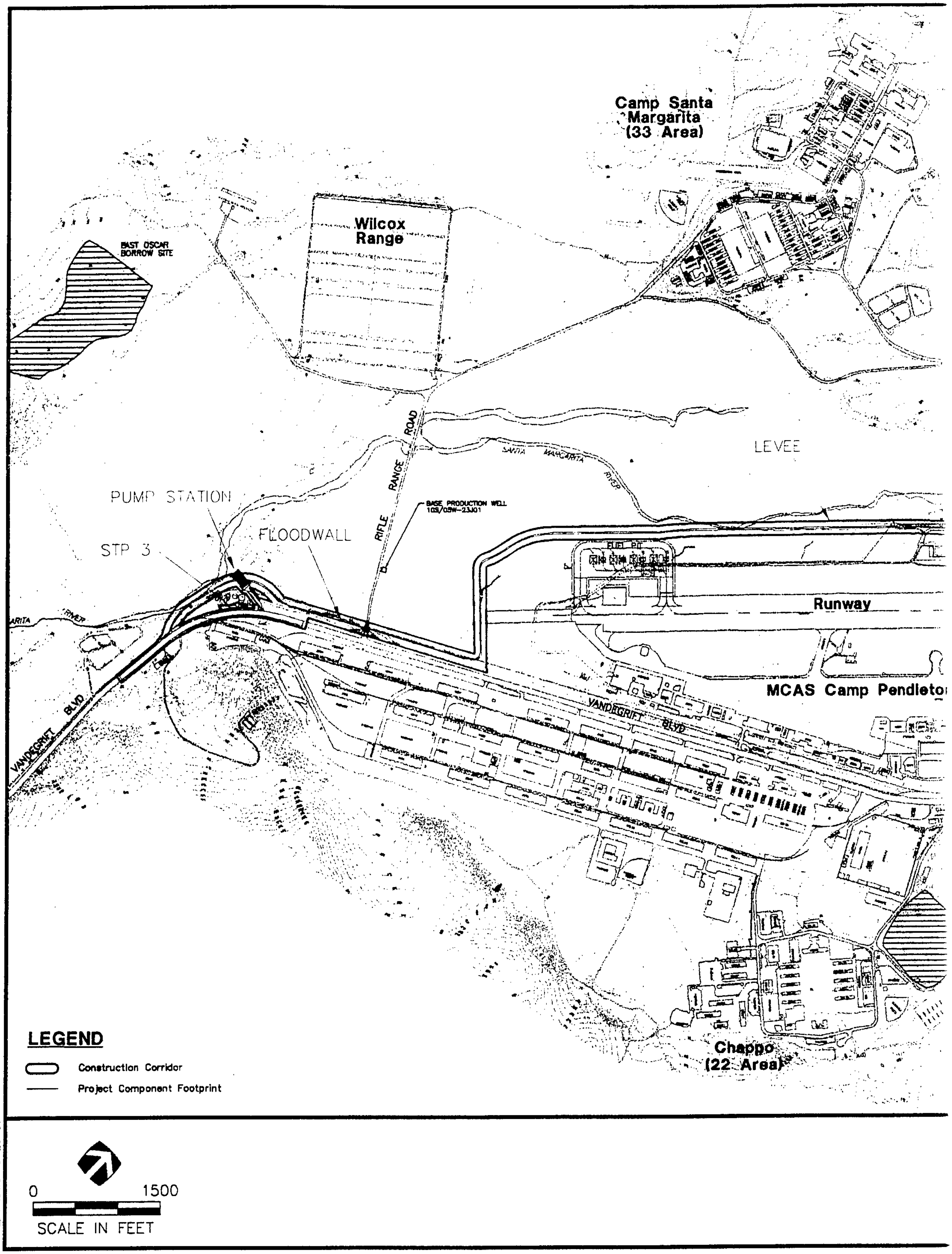

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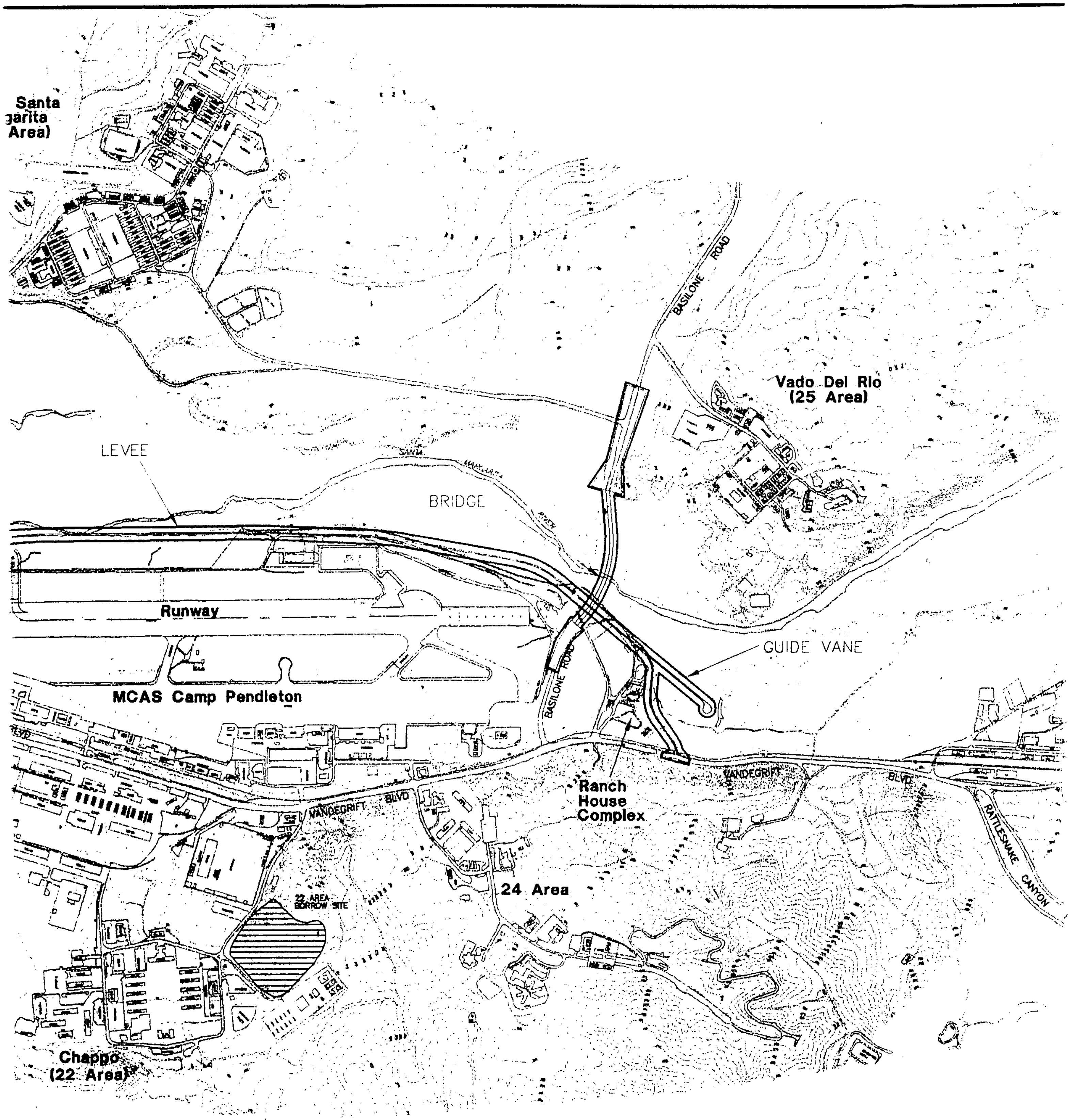
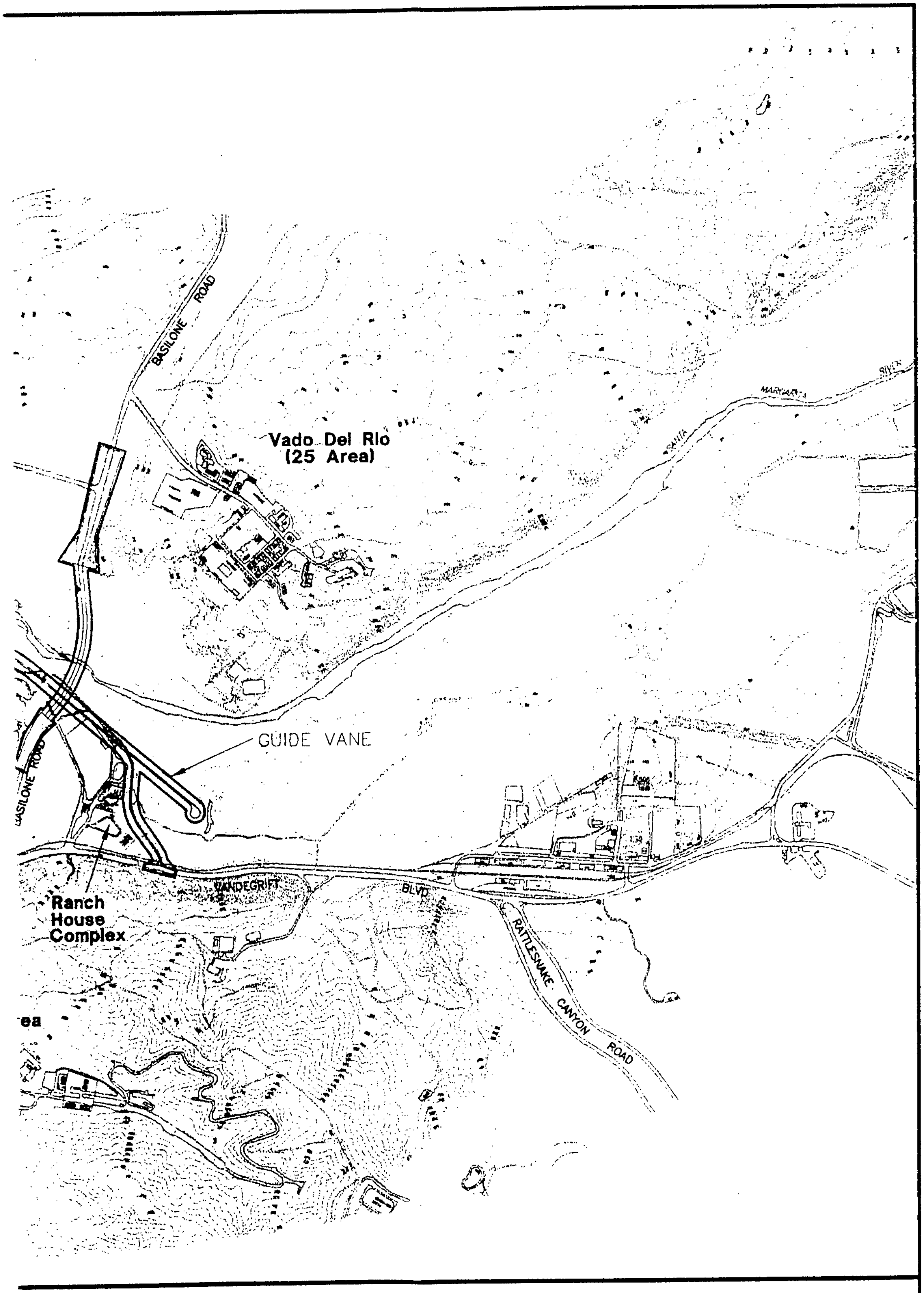

Santa
Margarita
Area)
Vado Del Rio
(25 Area)
LEVEE
BRIDGE
BASILONE ROAD
Runway
GUIDE VANE
MCAS Camp Pendleton
Ranch
House
Complex
VANDEGRIFT BLVD
RATTLESNAKE CANYON
24 Area
22 AREA BORROW SITE
Chappo
(22 Area)



Alternative 3B

Figure 2.3-6

(3)

bridge would be 1,375 feet long with 11 bents and 9 piers. The roadway approaches would be different from the road approaches with Alternative 3A due to the curve of the roadway; however, their size would be the same (Section 2.3.1.3).

2.3.2.3 Construction Requirements

Earthwork Requirements. Earthwork required for constructing the proposed levee and bridge approaches would be the same as with Alternative 3A (594,000 cubic yards total). The roadway approach with this alternative would contain a bend. The length of the roadway approach would be governed by the transition curves necessary to take Basilone Road from its existing grade to a height that would clear the levee. Fill sources for earthwork requirements would be the same as with Alternative 3A.

Trip Generation. Trip generation for this alignment would not differ greatly from Alternative 3A. Trips related to earth work would be unchanged. Trips related to bridge construction would increase slightly because of the increased bridge length. Table 2.3.2-1 shows the total trips for Alternative 3B.

Table 2.3.2-1

Alternative 3B
Construction Trips by Operation

Operation	Number of Trips
Fill material movement for levee and bridge approaches	32,090
Imported rock for levee and bridge slope protection (from Oceanside)	6,300
Onsite rock movement	1,890
Imported cement for soil cement levee face (from Oceanside)	1,190
Imported aggregate base and paving for levee road and bridge (from Oceanside)	3,780
Delivery of steel and pilings for floodwall and bridge	130
Concrete movement for pump station, floodwall and bridge	1,080
Total Trips:	**46,460**

Construction Workers. The number of construction workers on the site would be the same as with Alternative 3A.

2.3.3 Alternative 3C

This section describes Levee Alignment 3 and Bridge Alignment C. This alternative is shown in Figure 2.3-7.

2.3.3.1 Levee Alignment 3

The levee alignment for Alternative 3C would be the same as with Alternatives 3A and 3B, including the stormwater management system (Section 2.3.1.1).

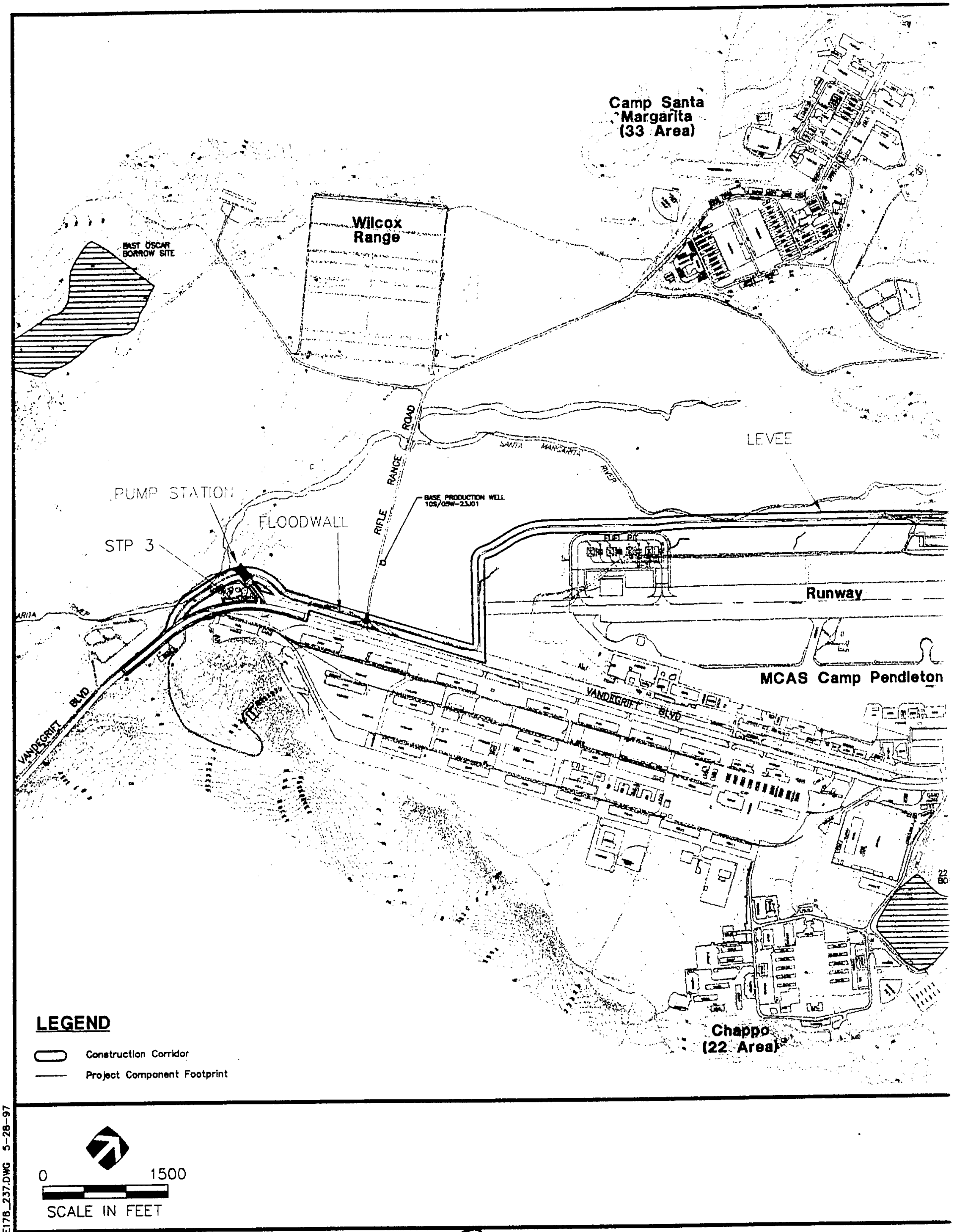
2.3.3.2 Bridge Alignment C - Rattlesnake Canyon Road Alignment

With this alignment, Basilone Road would be realigned approximately 1,200 feet to the northeast. The bridge would be located southwest of the existing intersection of Rattlesnake Canyon Road and Vandegrift Road. With this alternative, the bridge would be approximately 2,000 feet long with 16 bents and 14 piers. This alignment would also require the development of approximately 2,500 feet of new roadway across the bluff in the Vado Del Rio Area to connect with the north end of Basilone Road. An additional 2,000 feet of grading would be required on the south side of the Santa Margarita River to raise the road elevation and connect the south roadway approach with Vandegrift Boulevard. With this alignment, there would be no intrusion into the MCAS Camp Pendleton Approach-Departure Clearance Zone. The existing temporary bridge would be removed from over the Santa Margarita River.

2.3.3.3 Construction Requirements

Earthwork Requirements. Earthwork requirements with Alternative 3C would be 530,000 cubic yards for construction of the levee. The Rattlesnake Canyon Road alignment would require 93,433 cubic yards of fill material. The source of the material would be the same as with Alternatives 3A and 3B.

Trip Generation. Construction operations required for Alternative 3C would be similar to those required for Alternatives 3A and 3B. However, trip generation would be greater because of the longer bridge and the need to construct a 2,500-foot north roadway approach. Most of the trips generated as a result of the earthwork operations would be short-haul, off-road trips. Table 2.3.3-1 shows the total trips for Alternative 3C.


Camp Santa Margarita (33 Area)
Wilcox Range
EAST OSCAR BORROW SITE
RIFLE RANGE ROAD
SANTA MARGARITA RIVER
LEVEE
PUMP STATION
FLOODWALL
STP 3
BASE PRODUCTION WELL 10S/05W-23J01
FUEL PIT
Runway
MCAS Camp Pendleton
VANDEGRIFT BLVD
Chappo (22 Area)
LEGEND
Construction Corridor
Project Component Footprint
0
1500
SCALE IN FEET
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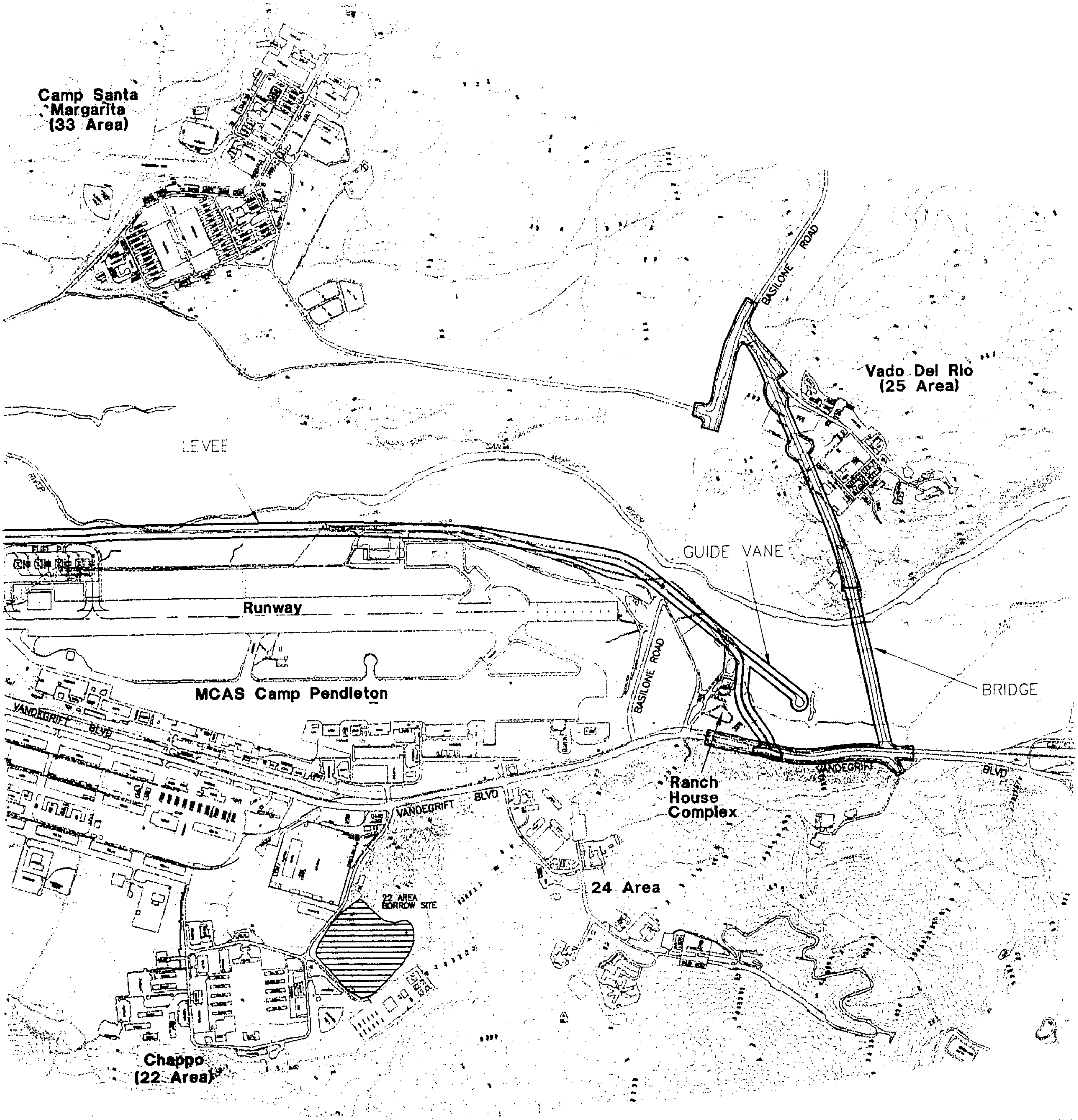
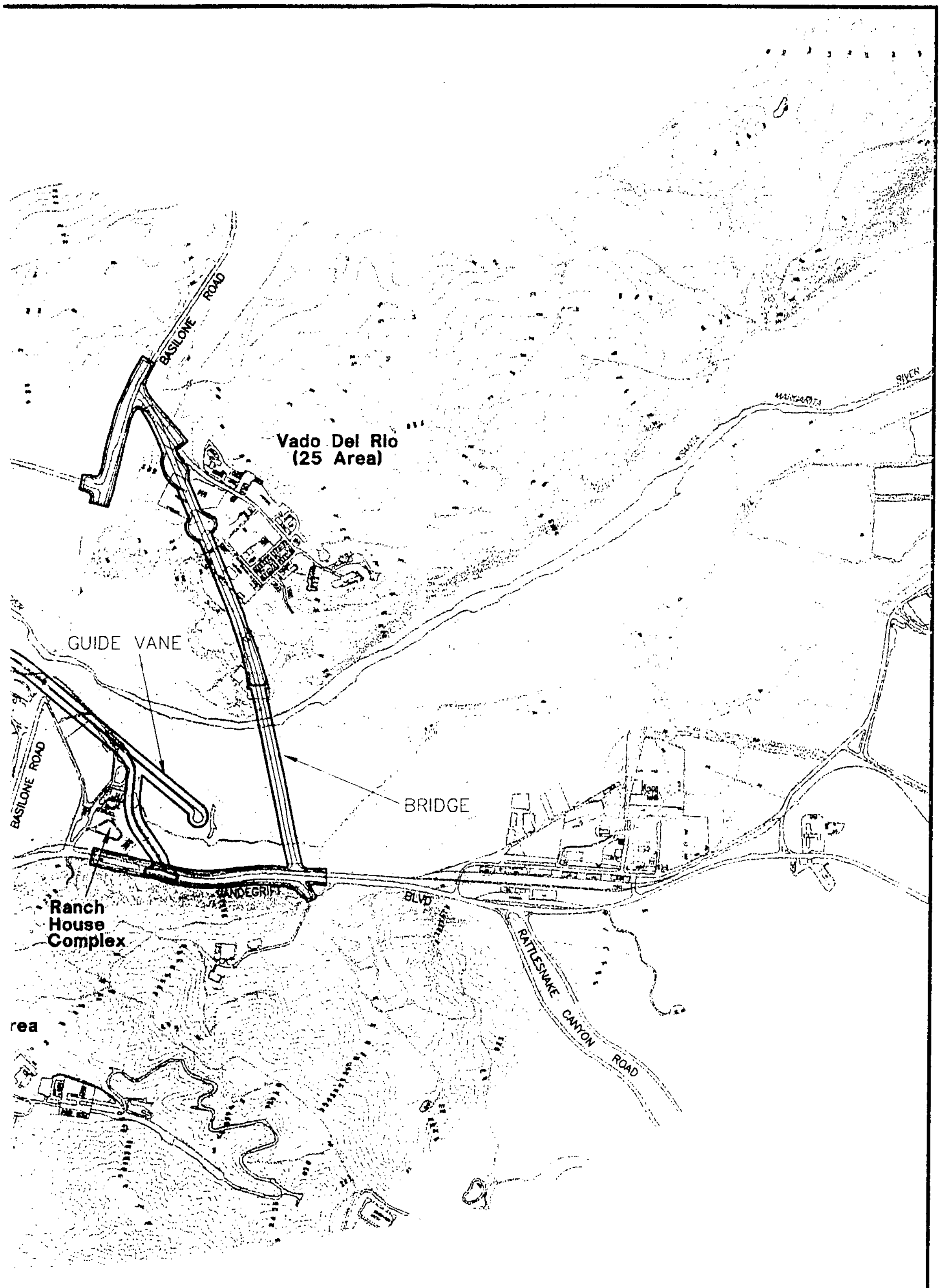
1


Camp Santa Margarita (33 Area)
BASILONE ROAD
Vado Del Rio (25 Area)
LEVEE
GUIDE VANE
Runway
BASILONE ROAD
BRIDGE
MCAS Camp Pendleton
VANDEGRIFT BLVD
VANDEGRIFT BLVD
VANDEGRIFT BLVD
Ranch House Complex
24 Area
22 AREA BORROW SITE
Chappo (22 Area)



Alternative 3C

Figure 2.3-7

Construction Workers. The number of construction workers on the site would be the same as with Alternatives 3A and 3B.

Table 2.3.3-1

Alternative 3C
Construction Trips by Operation

Operation	Number of Trips
Fill material movement for levee and bridge approaches	33,650
Imported rock for levee and bridge slope protection (from Oceanside)	6,300
Onsite rock movement	1,890
Imported cement for soil cement levee face (from Oceanside)	1,190
Imported aggregate base and paving for levee road and bridge (from Oceanside)	5,850
Delivery of steel and pilings for floodwall and bridge	160
Concrete movement for pump station, floodwall and bridge	1,350
Total Trips:	**50,390**

2.3.4 Alternative 1A

This section describes Levee Alignment 1 and Bridge Alignment A. This alternative is shown in Figure 2.3.8.

2.3.4.1 Levee Alignment 1

This alignment would consist of a 16,585-foot-long levee varying in height from 17 to 23 feet. The levee would extend from 3,400 feet upstream and east of the Santa Margarita Ranch House complex to approximately 1,000 feet downstream of STP No. 3 (Figure 2.3-3). This alignment would incorporate a 2,000-foot-long "tail" upstream of the Santa Margarita Ranch House complex on the south bank of the river and require significant grading of a bluff on the north side of the river at the same location. These features would smooth a major bend that the river makes through the Basilone Road Bridge area. A smoother bend would help prevent erosion of the levee and the riverbed in this area, and would encourage equilibrium along the project reach from a sediment transport perspective.

The majority of Levee Alignment 1 (11,685 feet) would have 3:1 side slopes (3 feet horizontal for every 1-foot rise) with a top width of 16 feet. With 3:1 side slopes, the levee would not require additional reinforcement along most of its length. Mechanical reinforcement would be utilized only in a 5,000-foot stretch of the levee near Basilone Road. In this critical stretch of the river, a minimal levee footprint is desired so that channel width can be maximized. The mechanical reinforcement

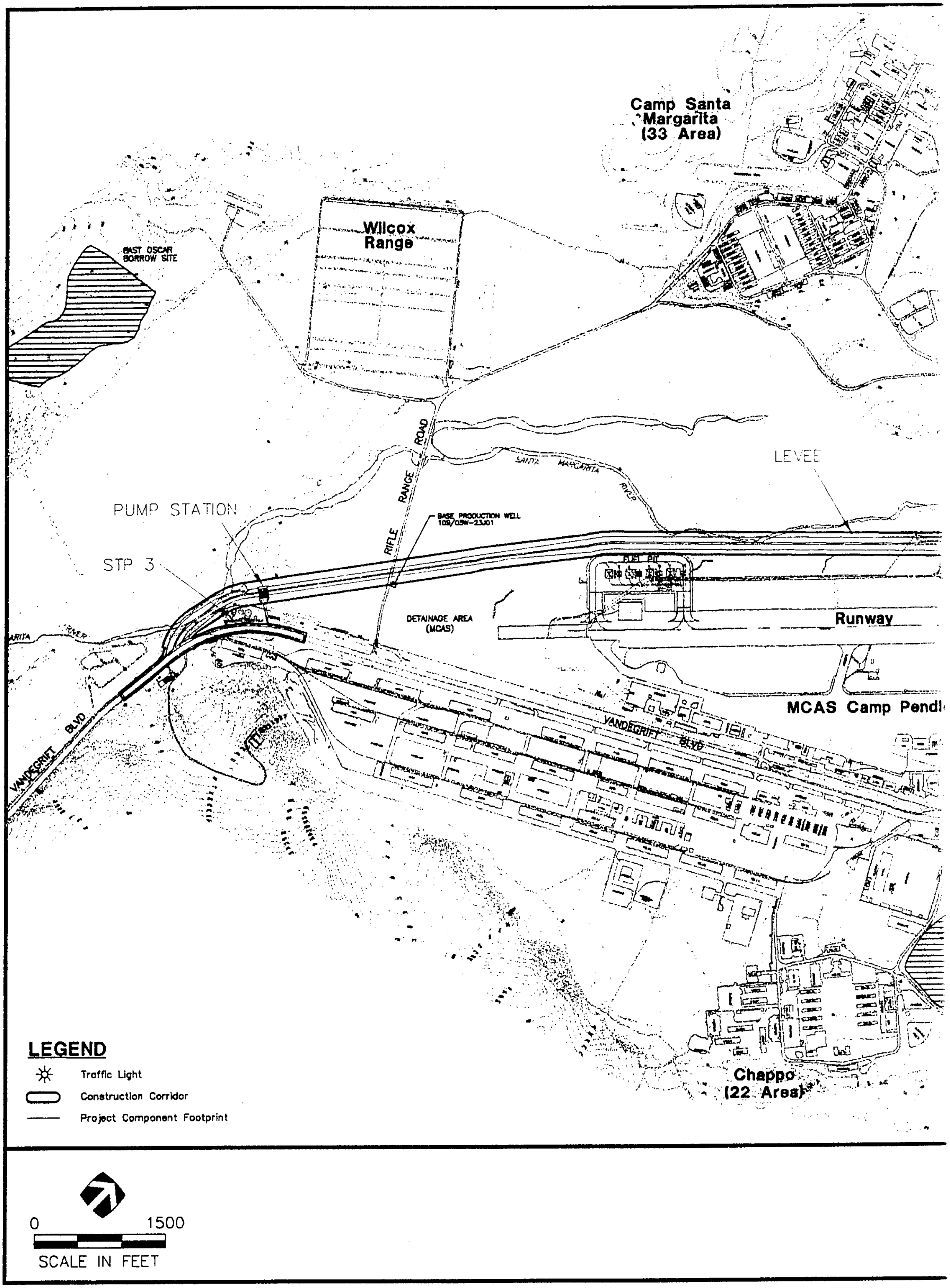
in this 5,000-foot stretch would reduce levee slopes to 1:1, resulting in a narrower levee cross-section.

River Training Structures - Spur Dikes/Silt Fences. In addition to the levee, a series of three river training structures would be incorporated. These structures would improve the angle at which the main channel crosses under Basilone Road Bridge. This would encourage the low flow channel to locate on the northern side of the riverbed, away from the main project features, to create an equilibrium state with respect to sediment balance throughout the project reach. An equilibrium state means that the river bed within the reach protected by the levee is neither aggrading (collecting sediment) or degrading (eroding) as a result of the project. These structures would consist of spur dikes, silt fences, and/or selected grading of the channel. The spur dikes would be constructed by excavating below the river bed and constructing an earth core/soil cement faced berm that extends approximately 5 feet above the river. The dikes would trap sediment during lower flow storm events (10 recurrence intervals). The sediment would be carried downstream during greater , more infrequent flooding events. Silt fences perform a similar function. They are a "softer" feature than spur dikes, and would provide some sediment control with a smaller impact area. Silt fences consist of a geotextile netting strung across metal fence posts. The fences would be placed in the river perpendicular to the banks. The fences would trap sediment in low flow events that would be released during the higher flow events, allowing sediment to be transported downstream. Selected bank grading could be used to create smoother bends and transitions in the river bed. Smooth transitions allow for more predictable and constant flow patterns across any given cross section, and would help to minimize erosion and deposition patterns that develop when a bend in the river results in increased flow velocity on one bank and decreased flow velocity on the other bank.

Stormwater Management System. The Stormwater Management System with Levee Alignment 1 would be similar to that described for Levee Alignment 3 (Section 2.3.1.2). However, Levee Alignment 1 would allow temporary inundation of an area west of MCAS Camp Pendleton (Figure 2.3-8) which in combination with the limited flow rate out of Chappo (22) Area culverts, would reduce pump station capacity from approximately 1,200 cfs to 500 cfs. Two 100-hp electric-driven main duty pumps would be available to manage low flows. Five 200-hp diesel-powered pumps would be available to manage the peak stormwater flows. A sixth 200-hp pump would be available to provide standby service.

2.3.4.2 Bridge Alignment A - Existing Basilone Road Bridge Alignment

The bridge alignment with Alternative 1A would be the same as with Alternative 3A (Section 2.3.1.3).



Camp Santa Margarita (33 Area)
Wilcox Range
EAST OSCAR BORROW SITE
LEVEE
SANTA MARGARITA RIVER
RIFLE RANGE ROAD
PUMP STATION
BASE PRODUCTION WELL
STP 3
DETAINAGE AREA (MCAS)
Runway
MCAS Camp Pendl
VANDEGRIFT BLVD
Chappo (22 Area)
LEGEND
Traffic Light
Construction Corridor
Project Component Footprint
0
1500
SCALE IN FEET
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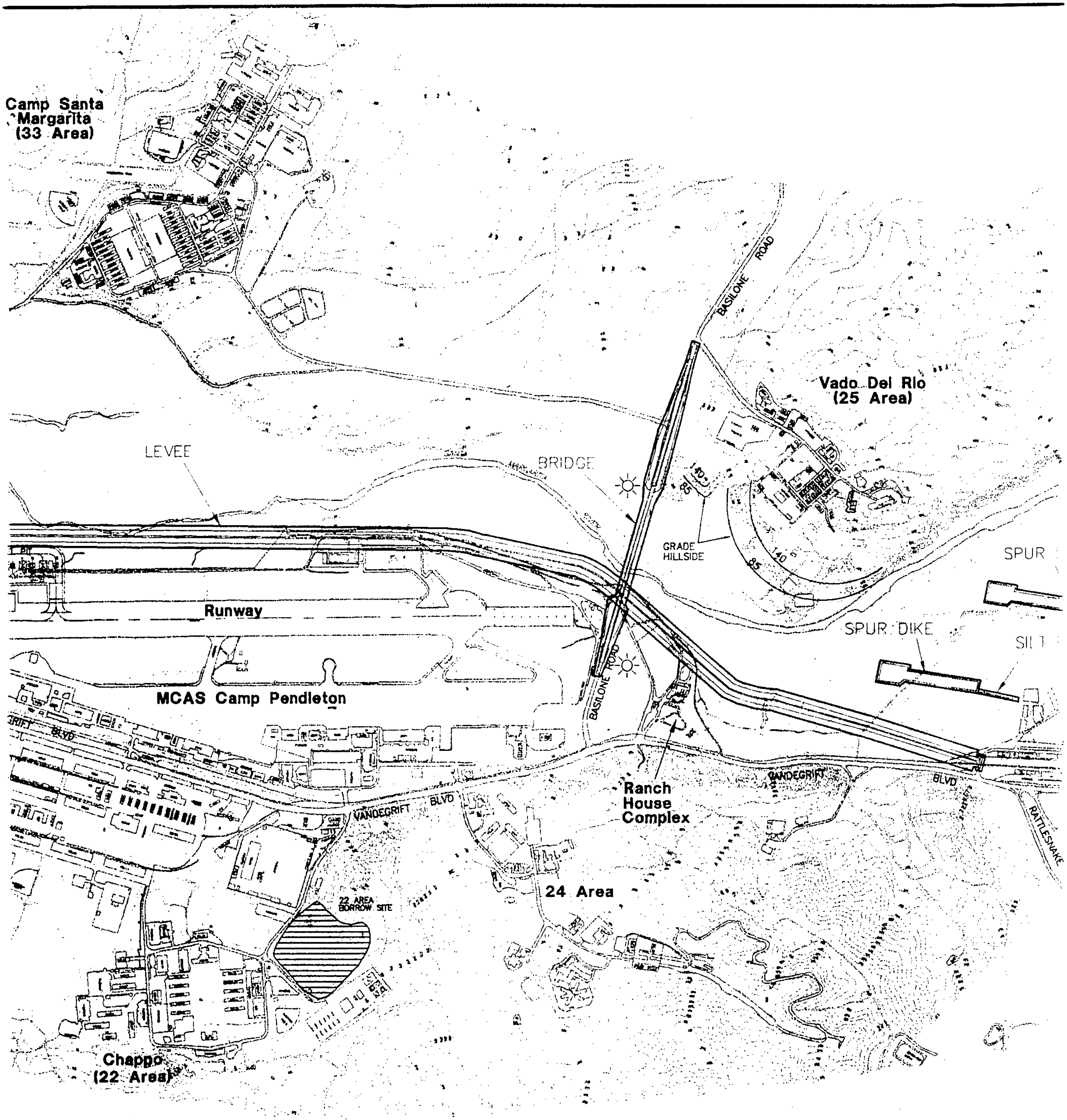
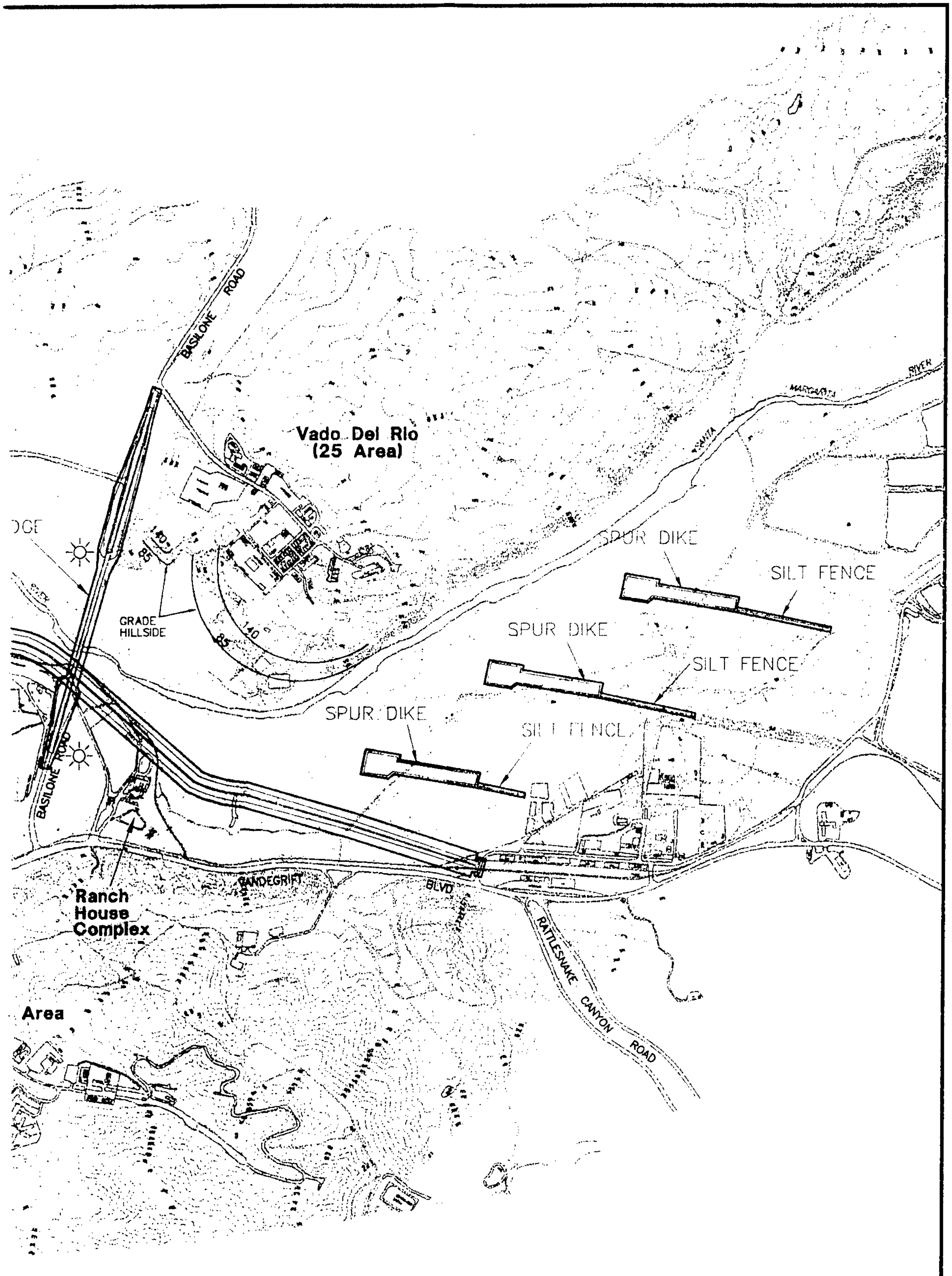


Camp Santa Margarita (33 Area)
Vado Del Rio (25 Area)
BASILONE ROAD
LEVEE
BRIDGE
GRADE HILLSIDE
SPUR
SPUR DIKE
Runway
MCAS Camp Pendleton
VANDEGRIFT BLVD
Ranch House Complex
RATTLESNAKE
24 Area
22 AREA BORROW SITE
Chappo (22 Area)



Alternative 1A

Figure 2.3-8

3

2.3.4.3 Construction Requirements

Earthwork Requirements. The levee and spur dike/silt fence system would require approximately 530,000 cubic yards of fill material. This material would be generated primarily from two onbase borrow areas, the demolition of the existing levee, excavation of the toe trench, and from the hillside grading on the north bank of the river. As with Alternative 3, the Chappo (22) Area borrow site would be used. As a result of the 3:1 side slope construction, the East Oscar borrow site would also be used. The hillside grading would generate a surplus of material (280,000 cubic yards) that would need to be hauled off the site to the "Three Mile" Pit, located 3 miles north of the intersection of Basilone Road and Vandegrift Boulevard, or off base. Roadway fills along Vandegrift Boulevard at the eastern and western limits of the project would be required to conform the elevation of the new levee to the existing roadway. The project would require 200 feet of road work at the eastern limit and approximately 1,000 feet of roadwork at the western limit. Approximately 64,000 cubic yards of fill material would be needed for the proposed bridge replacement.

Trip Generation. The construction operations for this project alternative would be similar to those with Levee Alignment 3, including short-haul dozer and scraper trips within the riverbed and medium-haul truck trips required to move fill material and rock material. Because of the longer levee, this alternative would generate approximately 66,790 truck trips, with an average length of 8 miles. Approximately 15 percent of these trips would be off road within the riverbed. The remainder of these trips would occur along Vandegrift Boulevard and Basilone Road in the vicinity of the project area and along Interstate 5 to Oceanside depending on the construction operations. A breakdown of trips by construction operation is presented in Table 2.3.4-1.

Construction Workers. The number of construction workers on the site would vary depending on the operations performed. At the peak of construction, there would be up to 150 workers for both the levee and bridge projects.

2.3.5 Alternative 1B

This section describes Levee Alignment 1 and Bridge Alignment B. This alternative is shown in Figure 2.3.9.

2.3.5.1 Levee Alignment 1

The levee alignment with Alternative 1B would be the same as with Alternative 1A, including the stormwater management system (Section 2.3.4.1).

Table 2.3.4-1

Alternative 1A
Construction Trips by Operation

Operation	Number of Trips
Fill material movement for levee and bridge approaches	35,300
Imported rock for levee and bridge slope protection (from Oceanside)	9,000
Onsite rock movement	2,100
Imported cement for soil cement levee face (from Oceanside)	1,610
Imported aggregate base and paving for levee road and bridge (from Oceanside)	4,180
Delivery of steel and pilings for floodwall and bridge	60
Concrete movement for pump station and bridge	540
Hillside grading	14,000
Total Trips:	**66,790**

2.3.5.2 Bridge Alignment B - East Curve Alignment

The bridge alignment with this alternative would be the same as with Alternative 3B (Section 2.3.2.2).

2.3.5.3 Construction Requirements

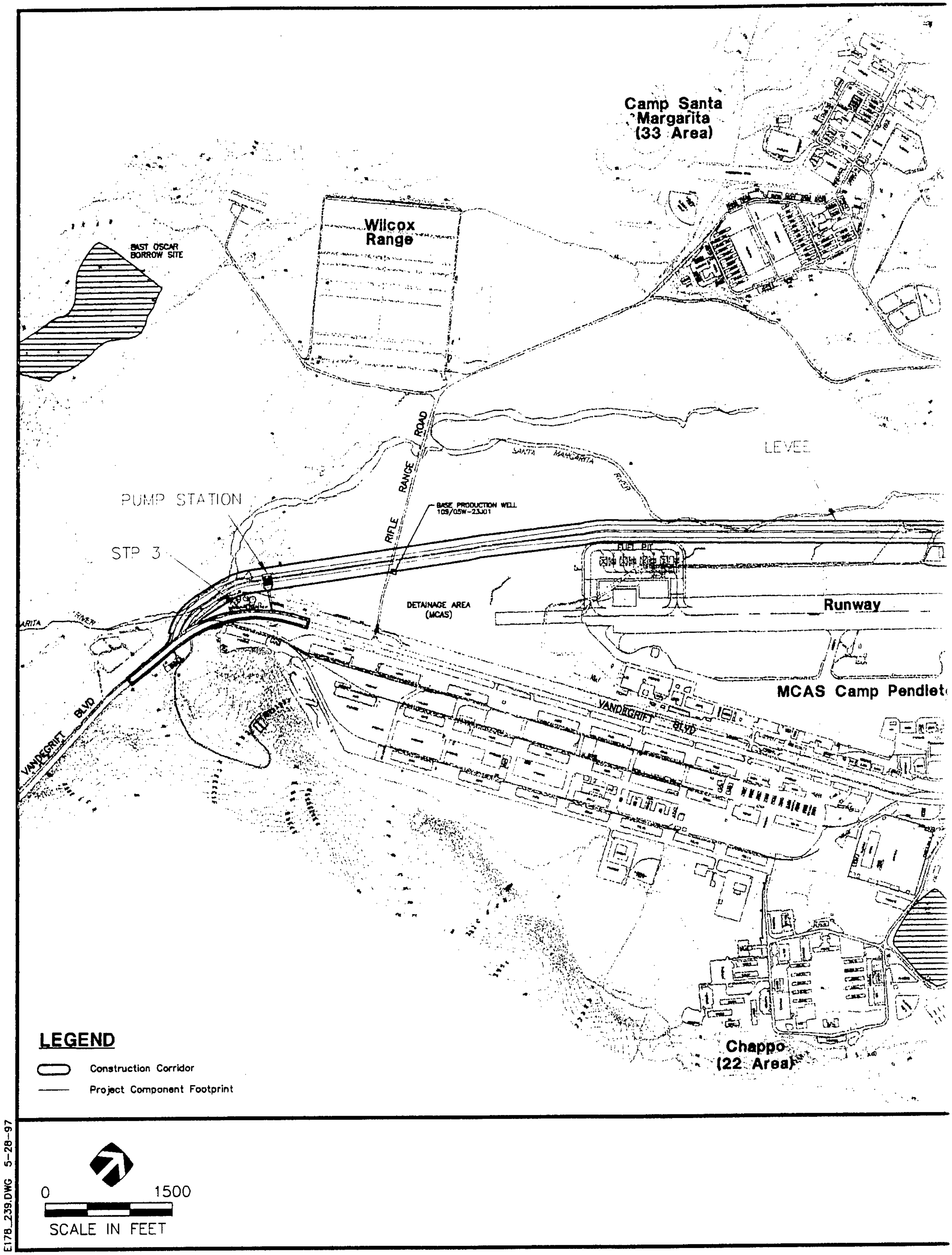
Earthwork Requirements. The amount of fill needed for construction with Alternative 1B would be similar to will needs with Alternative 1A.

Trip Generation. The total trips generated with Alternative 1B would be 66,850, which is slightly higher than trips generated with Alternative 1A because of the bridge alignment. Table 2.3.5-1 shows the breakdown of the trips by construction operations.

Construction Workers. The number of construction workers with Alternative 1B would be the same as with Alternative 1A.

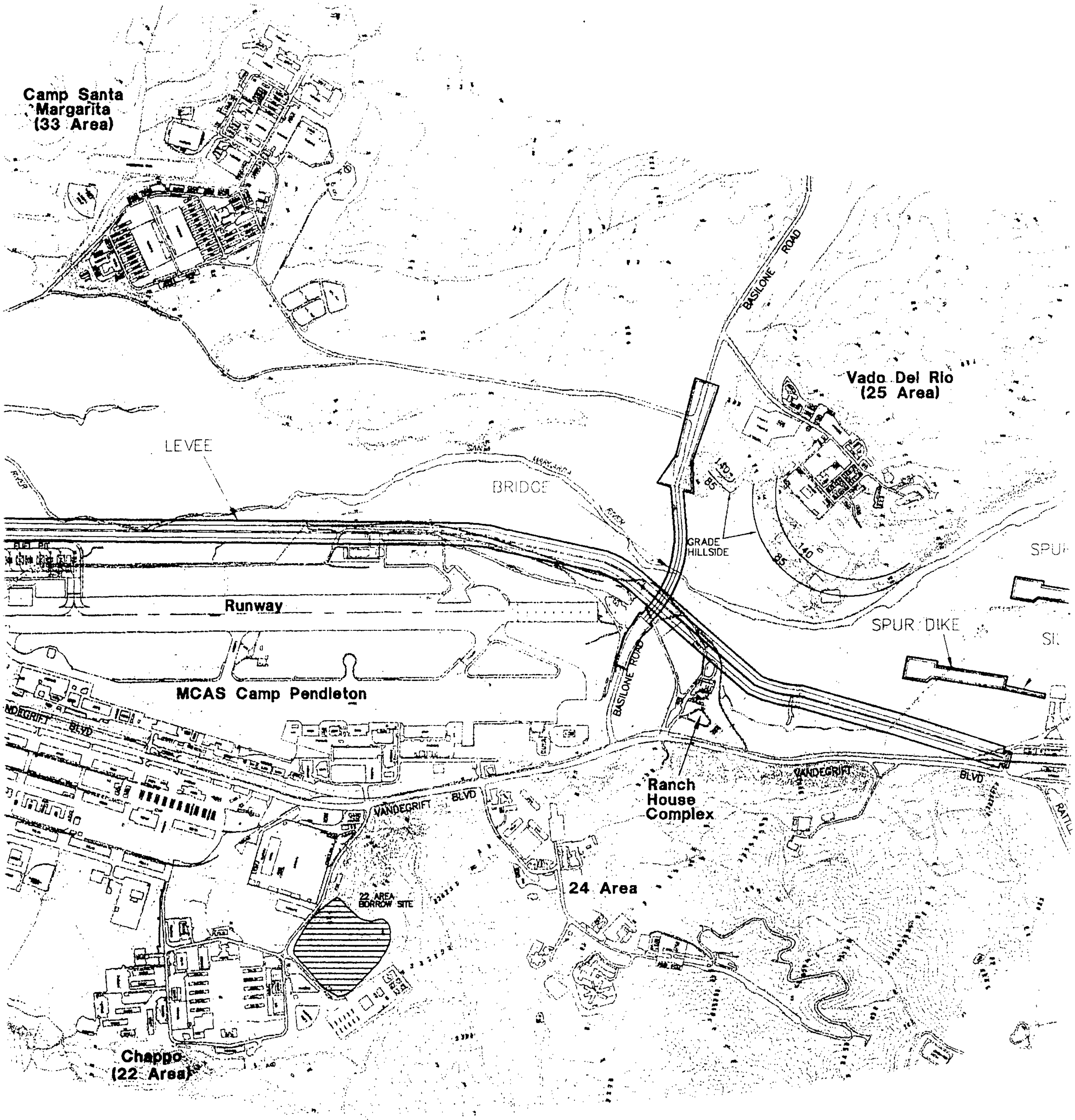
2.3.6 Alternative 1C

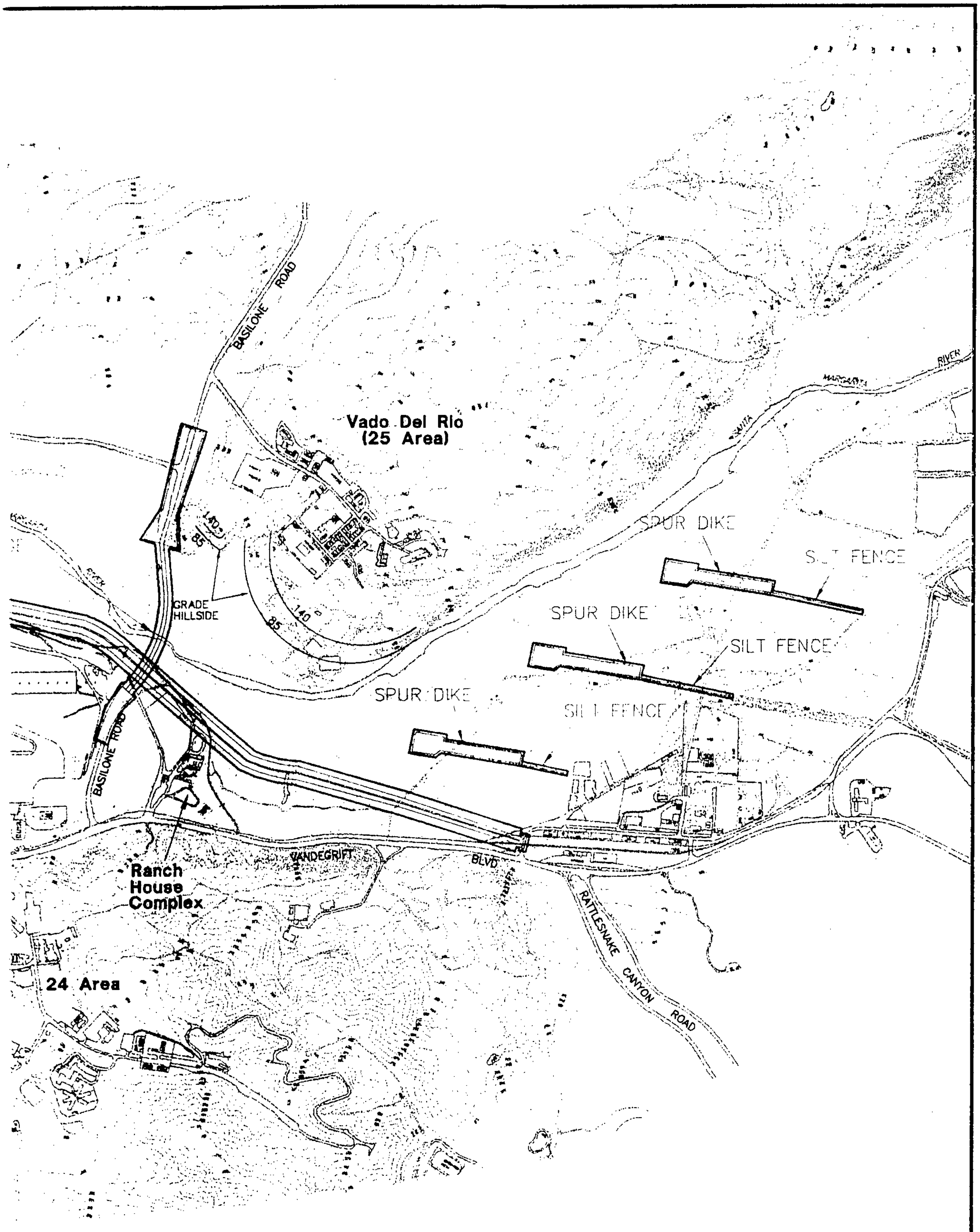
This section describes Levee Alignment 1 and Bridge Alignment C. This alternative is shown in Figure 2.3.10.



Camp Santa Margarita (33 Area)
Wilcox Range
EAST OSCAR BORROW SITE
ROAD
RANGE
RIFLE
LEVEE
SANTA MARGARITA RIVER
PUMP STATION
STP 3
BASE PRODUCTION WELL 10S/05W-23J01
FUEL PIT
DETAINAGE AREA (MCAS)
Runway
MCAS Camp Pendleton
VANDEGRIFT BLVD
Chappo (22 Area)
LEGEND
Construction Corridor
Project Component Footprint
0
1500
SCALE IN FEET
E178_239.DWG 5-28-97

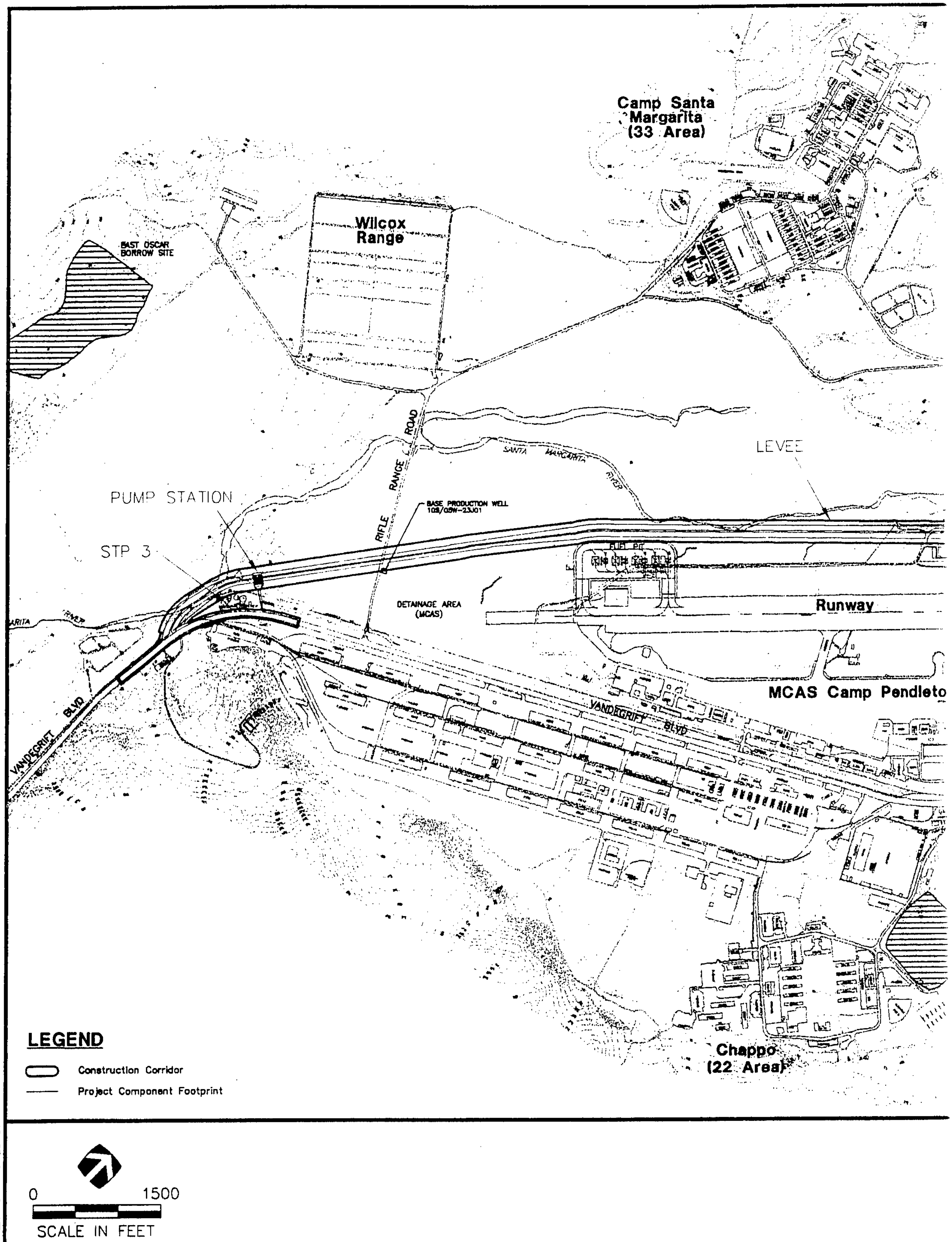
①


Camp Santa Margarita (33 Area)
Vado Del Rio (25 Area)
BASILONE ROAD
LEVEE
BRIDGE
GRADE
HILLSIDE
140
85
SPUR DIKE
Runway
MCAS Camp Pendleton
VANDEGRIFT BLVD
Ranch House Complex
24 Area
22 AREA BORROW SITE
Chappo (22 Area)



Alternative 1B

Figure 2.3-9



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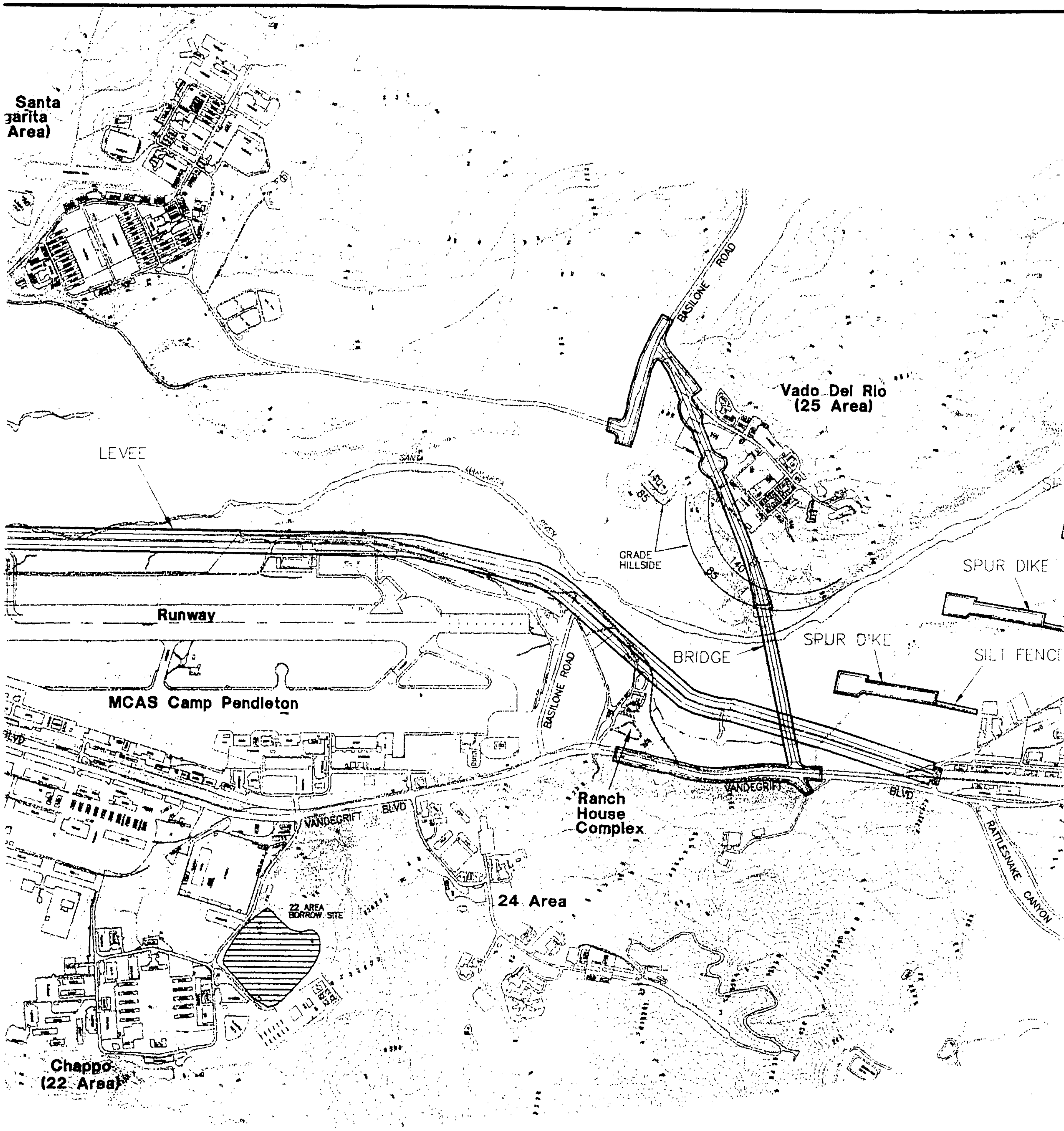
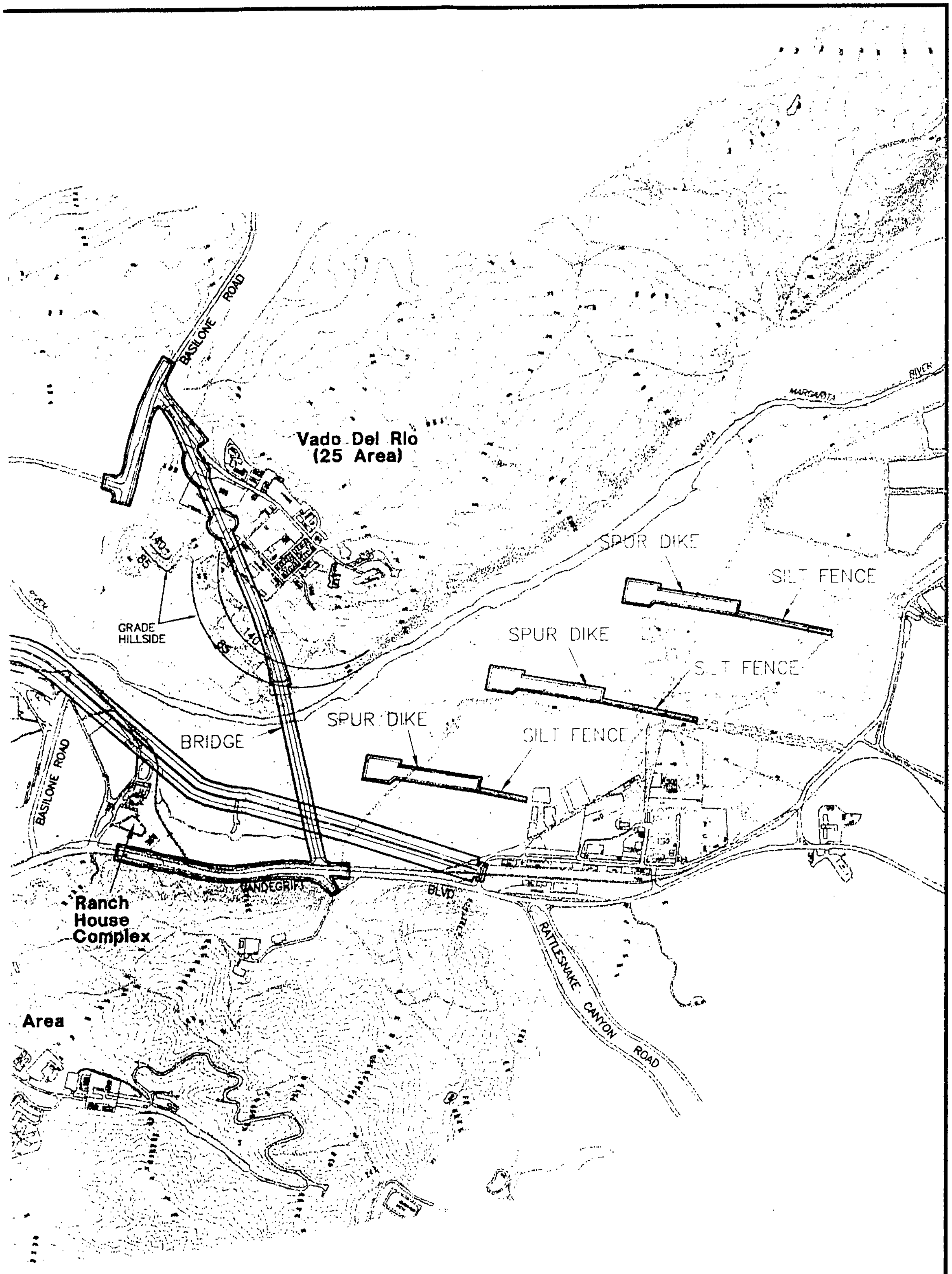

Santa
garita
Area)
BASILONE ROAD
Vado Del Rio
(25 Area)
LEVEE
GRADE
HILLSIDE
SPUR DIKE
Runway
SPUR DIKE
BRIDGE
SILT FENCE
MCAS Camp Pendleton
BASILONE ROAD
VANDEGRIFT
BLVD
VANDEGRIFT BLVD
Ranch
House
Complex
RATTLESNAKE CANYON
22 AREA
BORROW SITE
24 Area
Chappo
(22 Area)



Alternative 1C

Figure 2.3-10

Table 2.3.5-1

Alternative 1B
Construction Trips by Operation

Operation	Number of Trips
Fill material movement for levee and bridge approaches	35,300
Imported rock for levee and bridge slope protection (from Oceanside)	9,000
Onsite rock movement	2,100
Imported cement for soil cement levee face (from Oceanside)	1,610
Imported aggregate base and paving for levee road and bridge (from Oceanside)	4,180
Delivery of steel and pilings for pump station and bridge	70
Concrete movement for pump station and bridge	590
Hillside grading	14,000
Total Trips:	**66,850**

2.3.6.1 Levee Alignment 1

The levee alignment in the alternative would be the same as Alternatives 1A and 1B, including the Stormwater Management System (Section 2.3.4.1).

2.3.6.2 Bridge Alignment C - Rattlesnake Canyon Road Alignment

The Bridge Alignment with this alternative would be the same as with Alternative 3C (Section 2.3.3.2).

2.3.6.3 Construction Requirements

Earthwork Requirements. The amount of fill needed for the construction of Alternative 1C would be similar to fill requirements with Alternative 1A.

Trip Generation. The total trips generated with Alternative 1C would be 70,780, which is slightly higher than trips generated with Alternative 1B because of the bridge alignment. Table 2.3.6-1 shows the breakdown of the trips by construction operations.

Table 2.3.6-1

Alternative 1C
Construction Trips by Operation

Operation	Number of Trips
Fill material movement for levee and bridge approaches	36,860
Imported rock for levee and bridge slope protection (from Oceanside)	9,000
Onsite rock movement	2,100
Imported cement for soil cement levee face (from Oceanside)	1,610
Imported aggregate base and paving for levee road and bridge (from Oceanside)	6,250
Delivery of steel and pilings for pump station and bridge	100
Concrete movement for pump station and bridge	860
Hillside grading	14,000
Total Trips:	**70,780**

Construction Workers. The number of construction workers with Alternative 1C would be the same as with Alternative 1A.

2.3.7 Alternative 2A

This section describes Levee Alignment 2 and Bridge Alignment A. This alternative is shown in Figure 2.3-11.

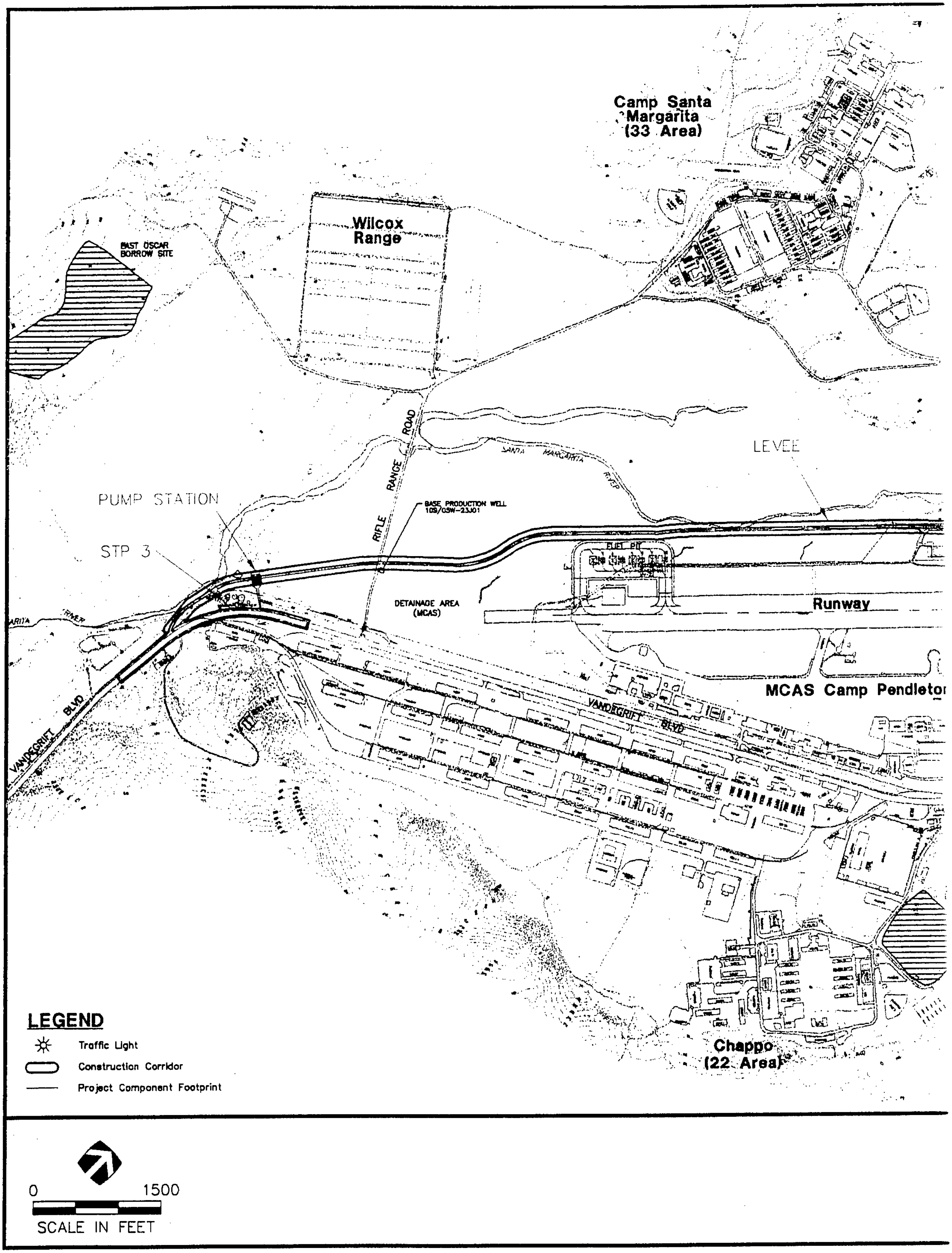
2.3.7.1 Levee Alignment 2

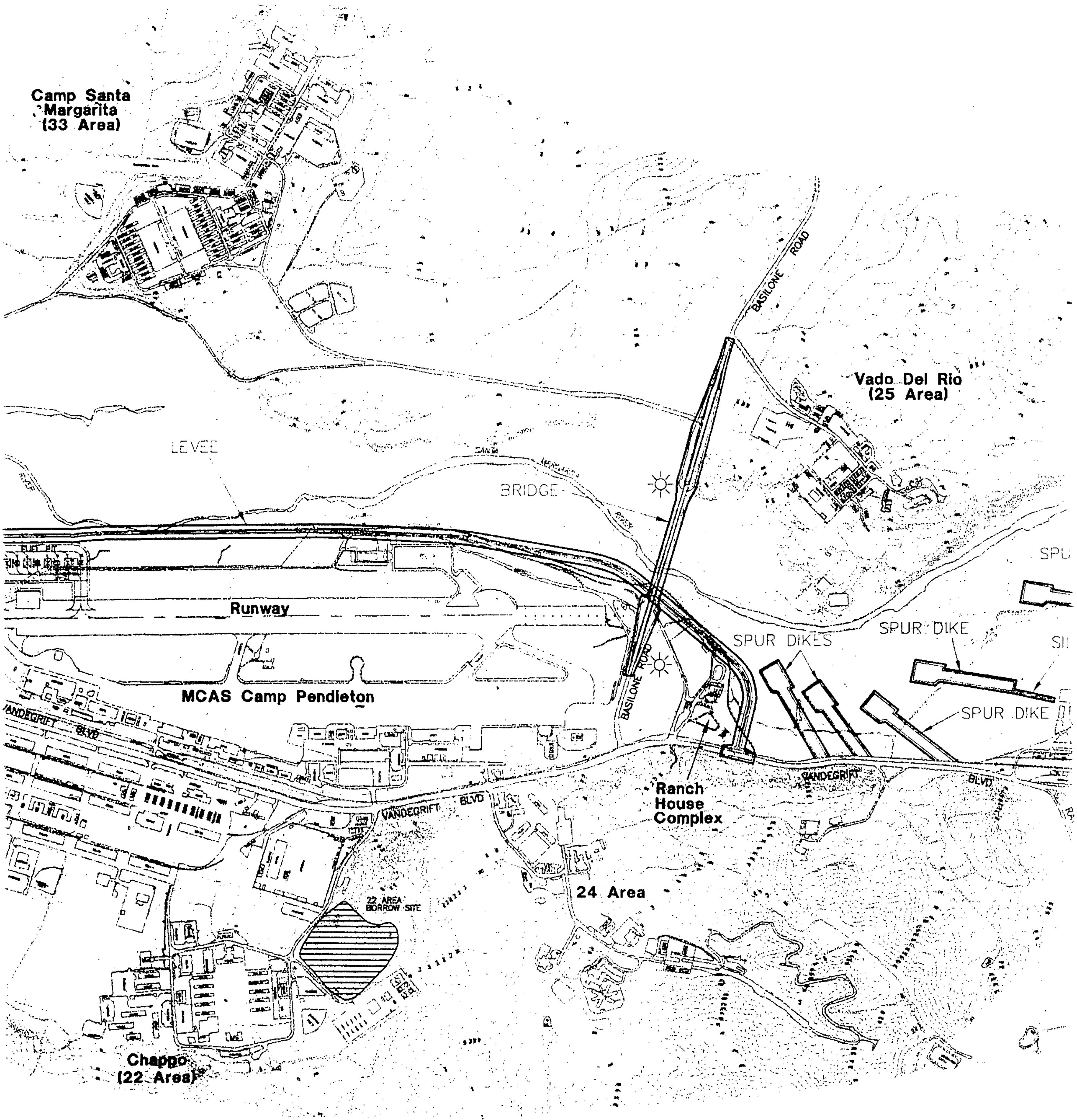
With this proposed alignment, the levee would wrap around the Santa Margarita Ranch House complex. This levee would be 15,200 feet in length. The entire levee would be constructed with side slopes of 1:1 using soil cement and mechanically reinforced earth. Six spur dikes would be constructed beginning at the Santa Margarita Ranch House complex to approximately 2,600 feet upstream. The mechanically reinforced earth levee would reduce the need for imported fill.

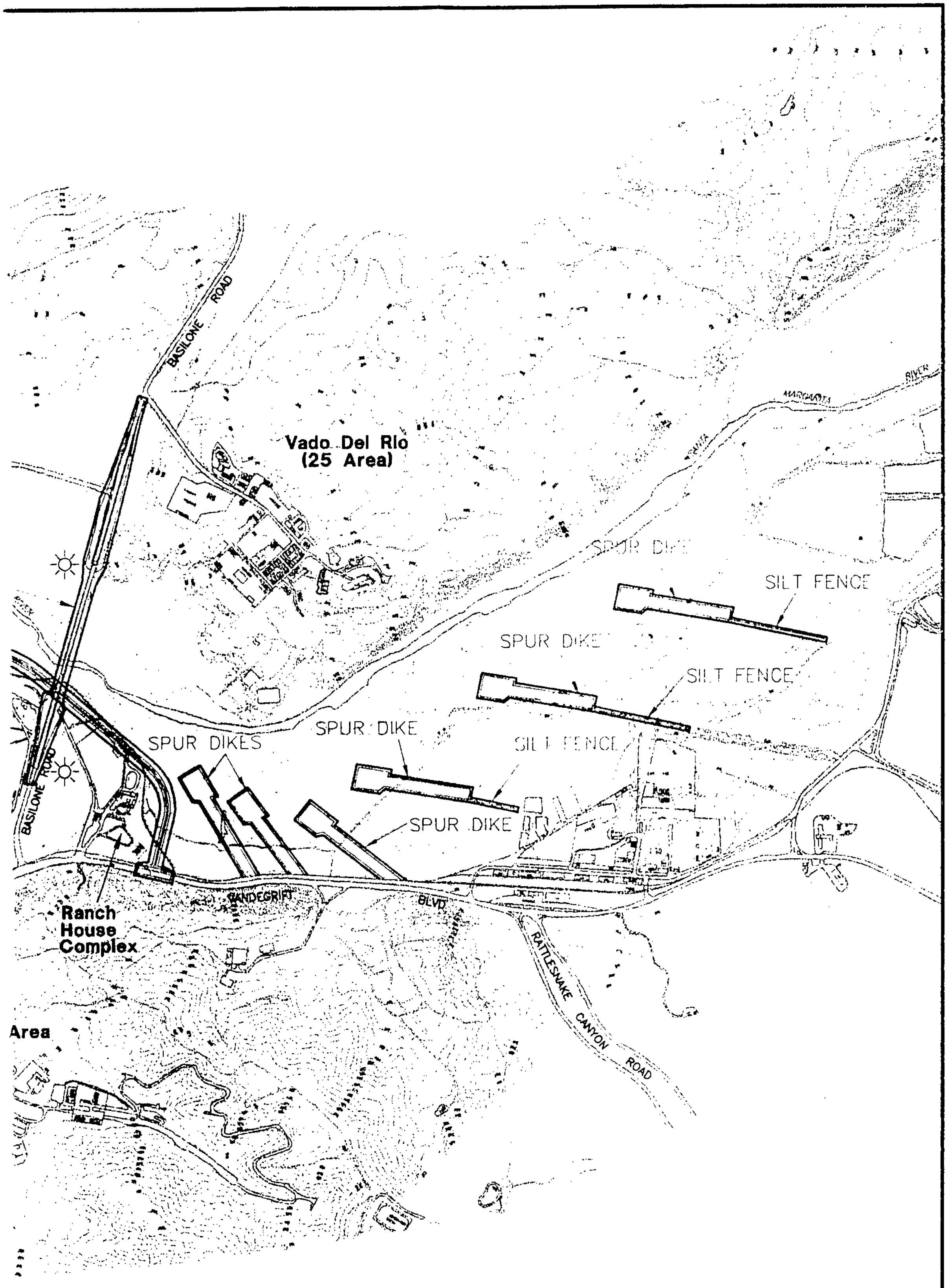
Stormwater Management System. The Stormwater Management System for Levee Alignment 2 would be the same as that described for Levee Alignment 1 (Section 2.3.4.1).

2.3.7.2 Bridge Alignment A - Existing Basilone Road Bridge Alignment

The bridge alignment for Alternative 2A would be the same as the bridge alignment for Alternative 3A. The existing Basilone Road Bridge Alignment is described in Section 2.3.1.3.


Camp Santa Margarita (33 Area)
Wilcox Range
EAST OSCAR BORROW SITE
RIFLE RANGE ROAD
SANTA MARGARITA RIVER
LEVEE
PUMP STATION
STP 3
BASE PRODUCTION WELL 10S/05W-23J01
FUEL PIT
DETAINAGE AREA (MCAS)
Runway
MCAS Camp Pendleton
VANDEGRIFT BLVD
Chappo (22 Area)
LEGEND
Traffic Light
Construction Corridor
Project Component Footprint
0
1500
SCALE IN FEET
E178_211.DWG 5-29-97


Camp Santa
Margarita
(33 Area)
BASILONE ROAD
Vado Del Rio
(25 Area)
LEVEE
BRIDGE
SPUR
Runway
SPUR DIKES
SPUR DIKE
MCAS Camp Pendleton
VANDEGRIFT BLVD
SPUR DIKE
VANDEGRIFT BLVD
Ranch
House
Complex
24 Area
22 AREA
BORROW SITE
Chappo
(22 Area)



Alternative 2A

Figure 2.3-11

2.3.7.3 Construction Requirements

Earthwork Requirements. The levee and spur dike system would require approximately 530,000 cubic yards of fill material. This material would be generated primarily from the onbase borrow area at Chappo (22) Area, and the excavation of the existing temporary levee and the toe trench of the new levee. In addition, 215,000 tons of rock for the levee windrow revetment would need to be imported from an offsite source (rock quarry).

Roadway fill along Vandegrift Boulevard at the eastern and western limits of the project would be required to conform the elevation of the new levee to the existing roadway. Levee Alignment 2 would require 200 feet of road work at the eastern limits and approximately 1,000 feet of roadwork at the western limits.

Trip Generation. The primary operations involved in constructing the levee, spur dike/silt fence, and bridge would be short-haul dozer and scraper trips within the riverbed, and medium-haul truck trips required to move fill and rock material. The breakdown by operation is summarized in Table 2.3.7-1.

Table 2.3.7-1

Alternative 2A
Construction Trips by Operation

Operation	Number of Trips
Fill material movement for levee and bridge approaches	35,300
Imported rock for levee and bridge slope protection (from Oceanside)	5,900
Onsite rock movement	2,100
Imported cement for soil cement levee face (from Oceanside)	1,830
Imported aggregate base and paving for levee road and bridge (from Oceanside)	4,180
Delivery of steel and pilings for floodwall and bridge	60
Concrete movement for pump station and bridge	540
Total Trips:	**49,910**

Construction Workers. The number of construction workers on the site would vary depending on the operations being performed. At the height of grading operations, 150 employees would be required for both the Levee and bridge projects.

2.3.8 Alternative 2B

This section describes Levee Alignment 2 and Bridge Alignment B. This alternative is shown in Figure 2.3-12.

2.3.8.1 Levee Alignment 2

Levee Alignment 2 is described in Section 2.3.7.1. The levee alignment for Alternative 2B would be the same as Alternative 2A, including the stormwater management system.

2.3.8.2 Bridge Alignment B - East Curve Alignment

The East Curve Alignment (Bridge Alignment B) would be the same for Alternatives 3B and 1B, and is described in Section 2.3.2.2.

2.3.8.3 Construction Requirements

Earthwork Requirements. Earthwork required for constructing the levee and bridge approaches would be the same as for Alternative 1B (594,000 cubic yards). The roadway approach with this alternative would contain a bend. The length of the roadway approach would be governed by the transition curves necessary to take Basilone Road from its existing grade to a height that would clear the levee. Sources for this requirement would be the same as with Alternative 2A.

Trip Generation. Trip generation with this alignment would not differ greatly from the existing alignment. Trips related to earth work would be unchanged. Trips related to bridge construction would increase slightly because of the increased bridge length. Table 2.3.8-1 shows the total trips for Alternative 2B.

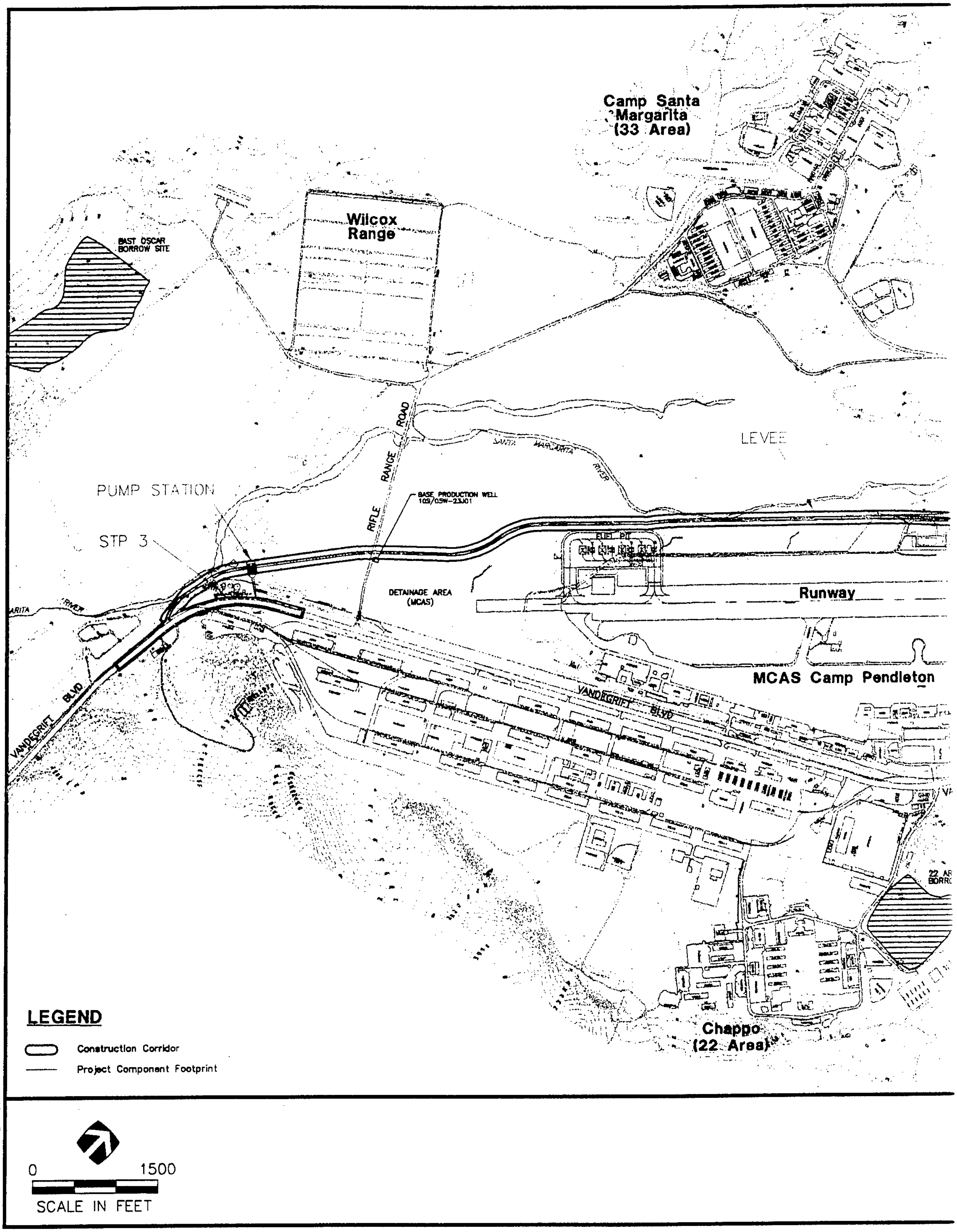
Construction workers. The number of construction workers on the site would be the same as with Alternative 2A.

2.3.9 Alternative 2C

This alternative is shown in Figure 2.3.13. This section describes Levee Alignment 2 and Bridge Alignment C.

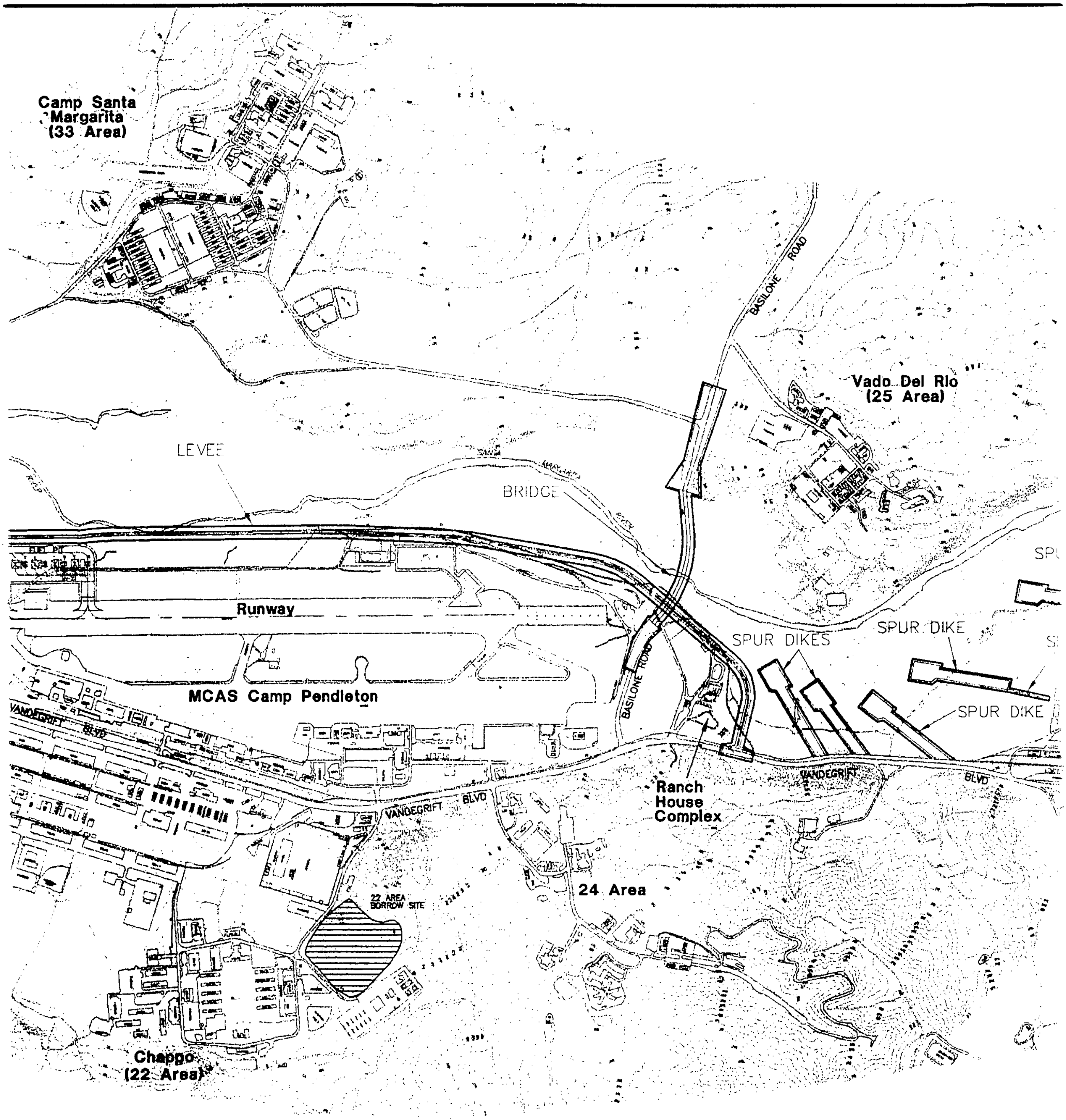
2.3.9.1 Levee Alignment 2

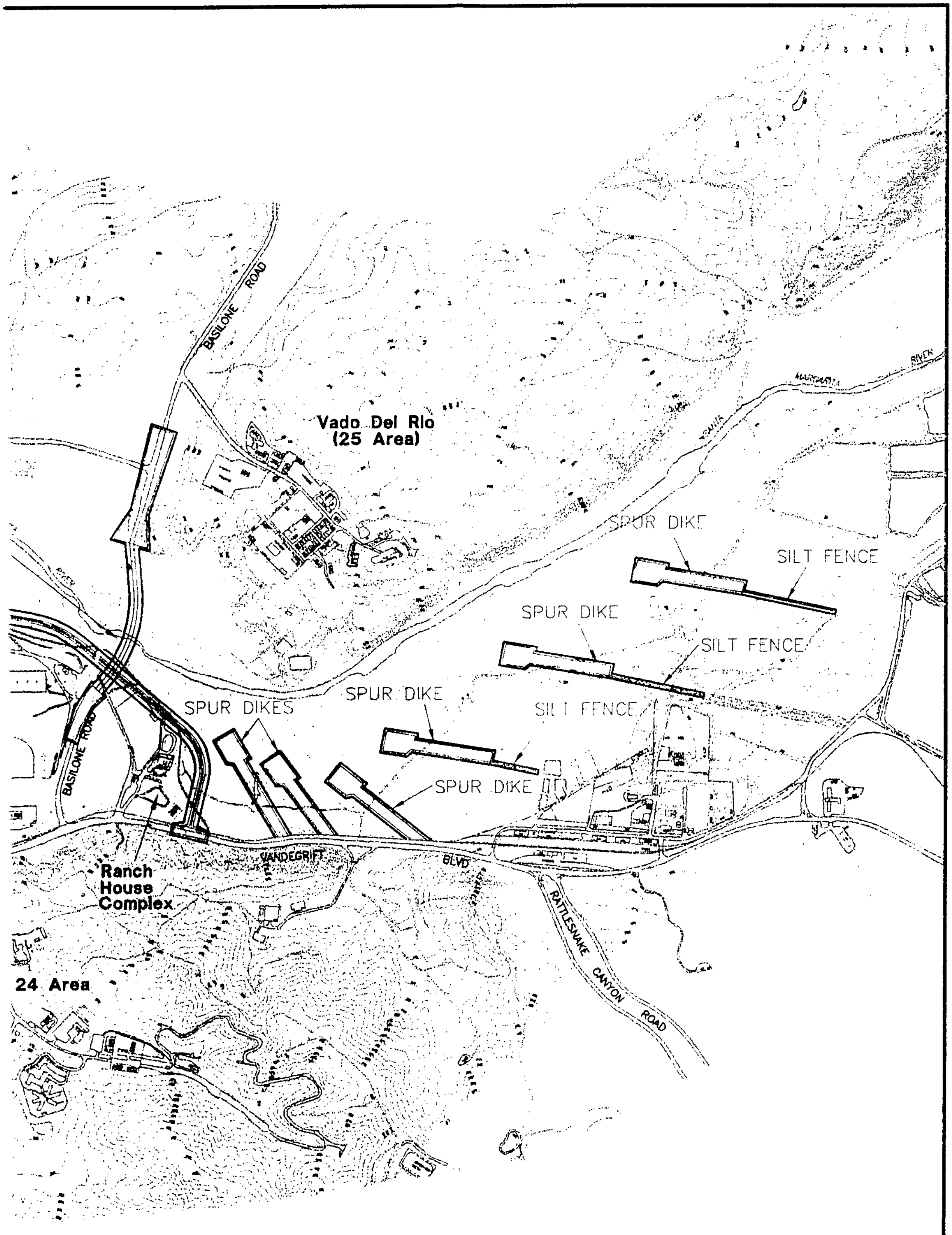
Levee Alignment 2 is described in Section 2.3.7.1. The levee alignment with this alternative would be the same.



Camp Santa Margarita (33 Area)
Wilcox Range
EAST OSCAR BORROW SITE
LEVEE
SANTA MARGARITA RIVER
RIFLE RANGE ROAD
PUMP STATION
STP 3
BASE PRODUCTION WELL 10S/05W-23J01
FUEL PIT
DETAINAGE AREA (MCAS)
Runway
MCAS Camp Pendleton
VANDEGRIFT BLVD
VANDEGRIFT BLVD
Chappo (22 Area)
LEGEND
Construction Corridor
Project Component Footprint
0
1500
SCALE IN FEET
E178_212.DWG 5-29-97

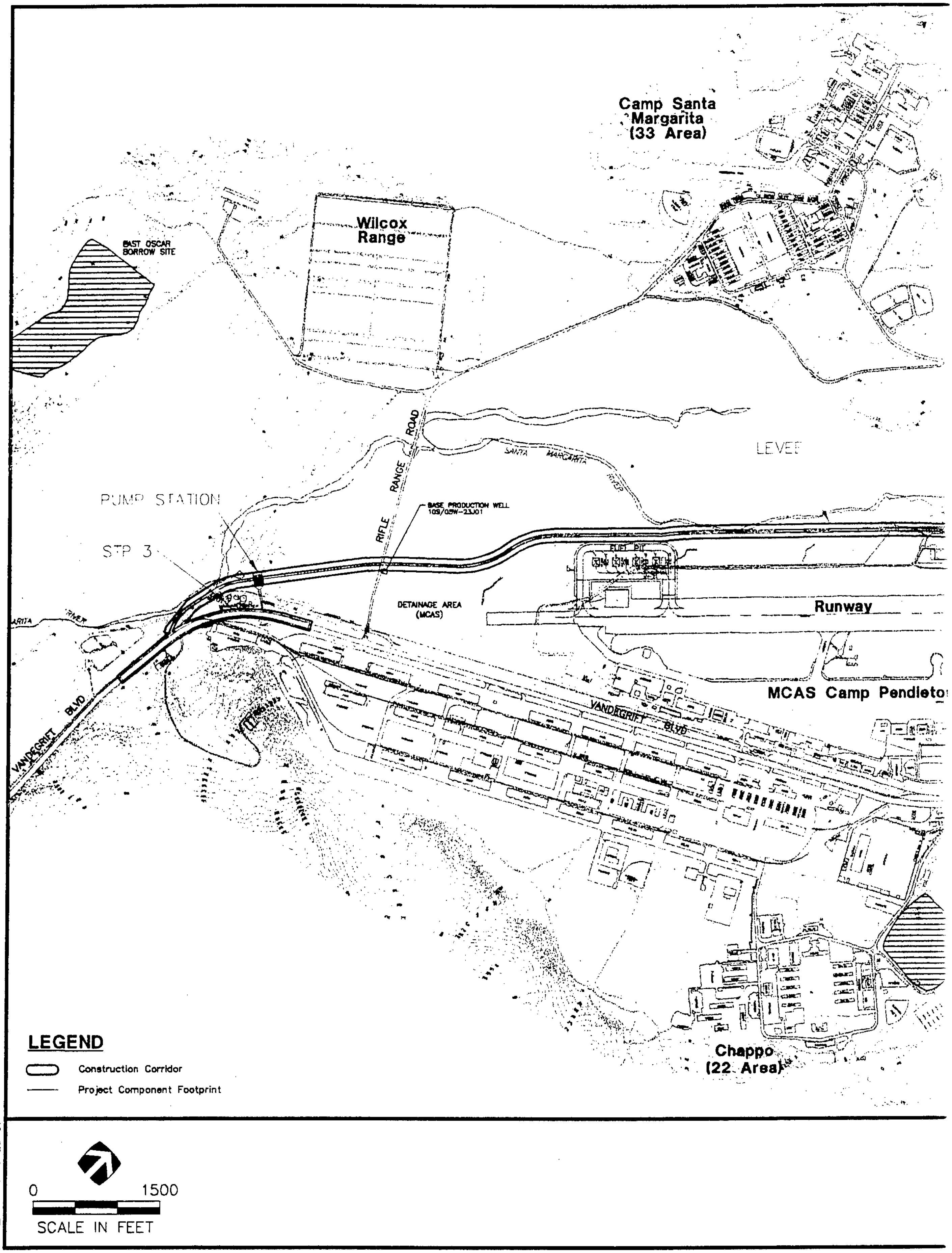
①


Camp Santa Margarita (33 Area)
BASILONE ROAD
Vado Del Rio (25 Area)
LEVEE
BRIDGE
Runway
MCAS Camp Pendleton
SPUR DIKES
SPUR DIKE
SPUR DIKE
VANDEGRIFT BLVD
Ranch House Complex
24 Area
22 AREA BORROW SITE
Chappo (22 Area)

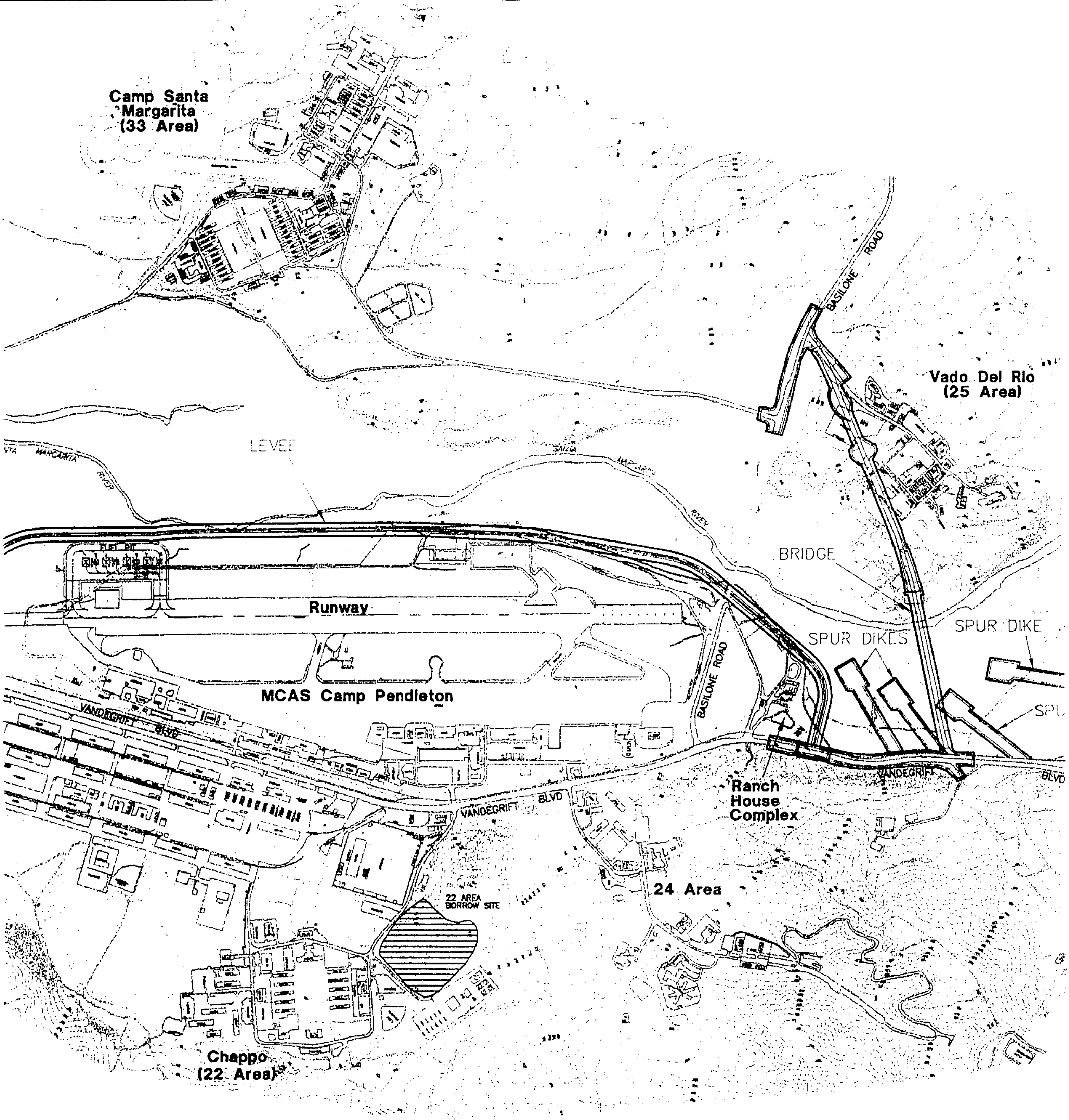


Alternative 2B

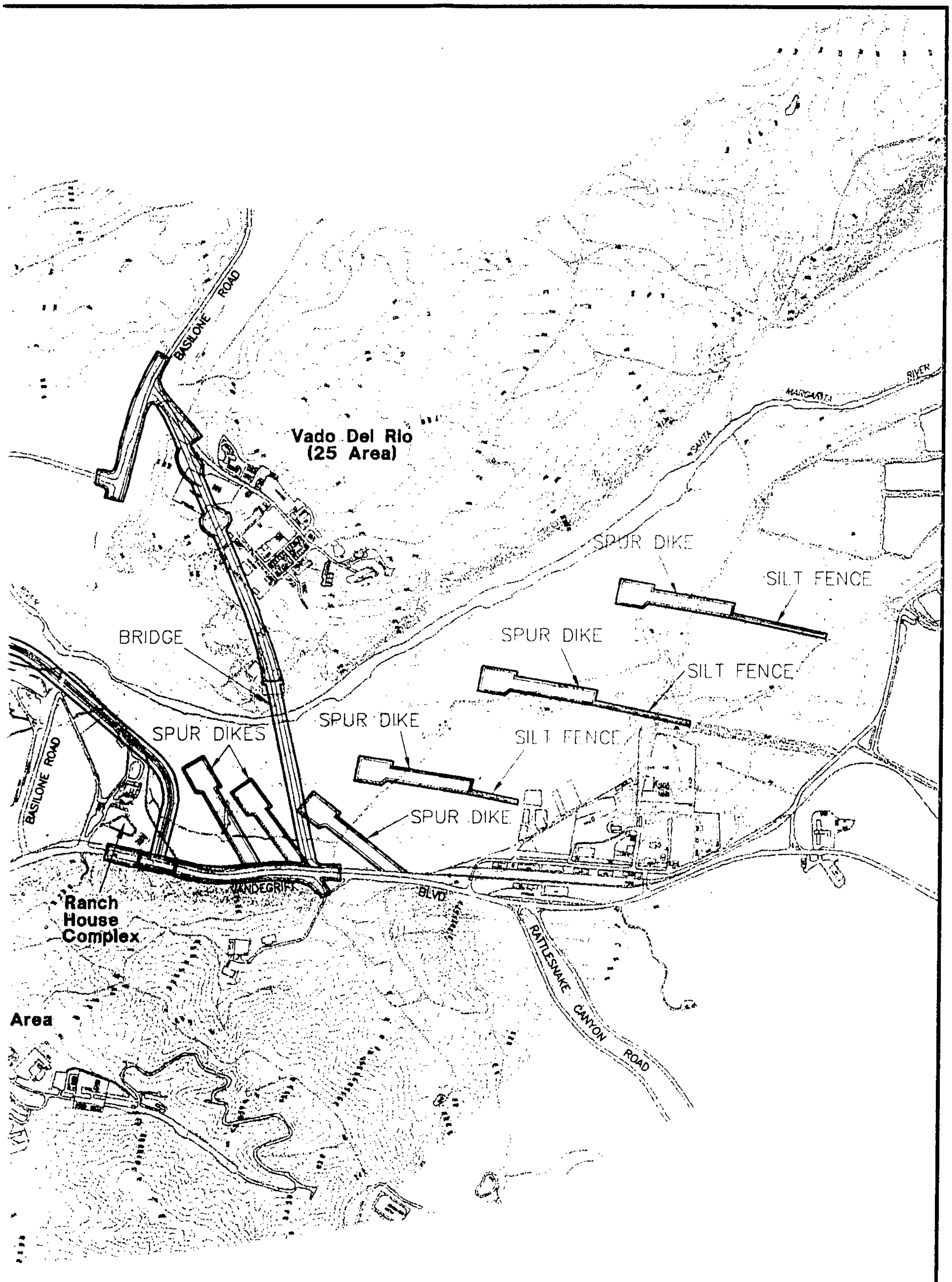
Figure 2.3-12



Camp Santa Margarita (33 Area)
Wilcox Range
EAST OSCAR BORROW SITE
LEVEE
SANTA MARGARITA RIVER
RIFLE RANGE ROAD
PUMP STATION
BASE PRODUCTION WELL 10S/05W-23J01
STP 3
FUEL PIT
DETAINAGE AREA (MCAS)
Runway
MCAS Camp Pendleton
VANDEGRIFT BLVD
Chappo (22 Area)
LEGEND
Construction Corridor
Project Component Footprint
0
1500
SCALE IN FEET
E178_213.DWG 5-28-97



Camp Santa Margarita (33 Area)
BASILONE ROAD
Vado Del Rio (25 Area)
LEVEE
MARGARITA
RIVER
SANTA
RIVER
FUEL PIT
BRIDGE
Runway
SPUR DIKES
SPUR DIKE
BASILONE ROAD
MCAS Camp Pendleton
VANDEGRIFT BLVD
Ranch House Complex
VANDEGRIFT BLVD
24 Area
22 AREA BORROW SITE
Chappo (22 Area)



Alternative 2C

Figure 2.3-13

Table 2.3.8-1

Alternative 2B
Construction Trips by Operation

Operation	Number of Trips
Fill material movement for levee and bridge approaches	35,300
Imported rock for levee and bridge slope protection (from Oceanside)	5,900
Onsite rock movement	2,100
Imported cement for soil cement levee face (from Oceanside)	1,830
Imported aggregate base and paving for levee road and bridge (from Oceanside)	4,180
Delivery of steel and pilings for floodwall and bridge	70
Concrete movement for pump station and bridge	590
Total Trips:	**49,970**

2.3.9.2 Bridge Alignment C - Rattlesnake Canyon Road Alignment

Section 2.3.3.2 describes Bridge Alignment C. The bridge alignment for Alternative 2C would be the same.

2.3.9.3 Construction Requirements

Earthwork Requirements. Earthwork requirements for Alternative 2C would be the same for construction of the levee. However, the Rattlesnake Canyon Road alignment would require 93,433 cubic yards of fill material. The source of the fill would be the same as for Alternatives 2A and 2B.

Trip Generation. Construction operations required for Alternative 2C would be similar to those required for Alternatives 2A and 2B. However, trip generation would be greater because of the longer bridge and the need to construct a 2,500-foot north roadway approach. Most of the trips generated as a result of the earthwork operations would be short-haul, off-road trips. Table 2.3.9-1 shows the total trips for Alternative 2C.

Construction Workers. The number of construction workers on the site would be the same as for Alternatives 3A and 3B.

2.3.10 No Action Alternative

With the No Action Alternative, the current flood management system, including the existing levee which received emergency repairs following the 1993 flood would be retained. The current flood management system does not offer any protection against major flooding and would likely result in

Table 2.3.9-1

Alternative 2C
Construction Trips by Operation

Operation	Number of Trips
Fill material movement for levee and bridge approaches	36,860
Imported rock for levee and bridge slope protection (from Oceanside)	5,900
Onsite rock movement	2,100
Imported cement for soil cement levee face (from Oceanside)	1,830
Imported aggregate base and paving for levee road and bridge (from Oceanside)	6,250
Delivery of steel and pilings for floodwall and bridge	100
Concrete movement for pump station and bridge	860
Total Trips:	**53,900**

inundation of MCAS Camp Pendleton during 25- to 50-year flood events and catastrophic damages to base facilities for events greater than a 50-year recurrence interval. Such damage would seriously jeopardize the readiness and mission capabilities of MCB Camp Pendleton and MCAS Camp Pendleton. During normal precipitation conditions, the existing levee system would require on-going maintenance and repair; however, major repairs similar to those made following the 1993 flood would be required whenever the levee is breached.

The No Action Alternative would also retain the existing temporary Basilone Bridge which was constructed from railroad cars as an emergency repair following the 1993 flood. This temporary bridge, which has load restrictions and a 30 miles per hour (mph) speed limit that constrain some existing mission activities, would require on-going maintenance and repair during normal operations. The existing bridge would, however, be subject to catastrophic damage during flood events of 25-year or greater magnitude and would require replacement.

2.3.10.1 Flood Control

With the No Action Alternative, there would be no construction of any new flood control project. The existing temporary levee would be left in place. This would provide some level of protection to the MCAS Camp Pendleton airfield area. However, the temporary levee extends only half way down the airfield, leaving MCAS Camp Pendleton subject to inundation from a 25-year or greater flood event (Winzler & Kelly, 1996). The result would be potential flooding of MCAS Camp Pendleton, the Chappo (22) Area, STP No. 3, and portions of the Santa Margarita Ranch House complex during high flow events along the Santa Margarita River. If the flood control project is not

implemented, the stormwater management system would not be required. Therefore, a No Action Alternative for the stormwater management system was not evaluated independently from the No Action Alternative for flood control.

2.3.10.2 Basilone Road Bridge Replacement

With the No Action Alternative, Basilone Road Bridge would not be replaced. The existing bridge was constructed to provide a useful life span of 5 years. In addition, the existing bridge elevation would conflict with the height of the proposed flood control project (P-010) and would be demolished. Under either scenario, removal of the existing bridge would eliminate Basilone Road as a major north-south circulation route and Santa Margarita River transportation crossing. This would conflict with MCB Camp Pendleton and MCAS Camp Pendleton operations, and would result in all traffic crossing Santa Margarita River at Interstate 5 or Stuart Mesa Road, both located approximately 6 miles to the west of MCAS Camp Pendleton.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

As part of the screening process described in Section 2.1, Overview, MCB Camp Pendleton conducted a planning, evaluation, and screening process to identify alternatives that would meet the purpose and need of the Proposed Action. This screening process was used to compare alternatives on the basis of the three major goals of the overall program. The major goals of the decision process (practicability, operational effectiveness and environmental impacts) were analyzed to identify specific measures which could be used for evaluation. The analysis process began with defining the three major goals as they applied to the basic purposes of the program:

Goal 1: **Maximize System Practicability** (100-year flood control and bridge engineering feasibility and cost)

Goal 2 **Maximize System Operational Effectiveness** (timely and dependable base mission support)

Goal 3 **Minimize Environmental Impacts** (avoidance, minimization and mitigation of potential impacts on environmental resources)

Specific selection criteria were then defined for each of the three program goals. These criteria are described in detail in Appendix B.

The selection criteria for the Santa Margarita River Flood Control Project (P-010) were as follows:

Criterion 1A: Engineering Feasibility - Hydraulic Control
Criterion 1B: Engineering Feasibility - Sediment Control
Criterion 1C: Engineering Feasibility - Channel Maintenance
Criterion 1D: Engineering Feasibility - Channel Width
Criterion 2A: Operations - MCB Camp Pendleton/MCAS Camp Pendleton Mission
Criterion 2B: Operations - MCAS Flight Pattern Intrusion
Criterion 2C: Operations - Timeliness
Criterion 3A: Environmental Impacts - Water Resources
Criterion 3B: Environmental Impacts - Biological Resources

The selection criteria for the Basilone Road Bridge Replacement (P-030) were as follows:

Criterion 1: Engineering Feasibility - Bridge Span/Channel Width
Criterion 2A: Operations - MCB Camp Pendleton/MCAS Camp Pendleton Mission
Criterion 2B: Operations - MCAS Camp Pendleton Flight Pattern Intrusion
Criterion 3: Environmental Impacts - Biological Resources

Based on a comparison of the ratings of alternatives for each of these criteria in fulfillment of all three overall program goals, the range of alternatives to be considered in the EIS was reduced to three flood control alignments and three bridge alignments.

The following is a summary of alternatives to the proposed action considered but eliminated from further analysis, based on the selection criteria. These criteria included: engineering feasibility such as hydraulic control, sediment control, channel maintenance requirements, and channel width requirements; mission requirements at MCB Camp Pendleton and flight operations at MCAS Camp Pendleton, and the timeliness of providing adequate 100-year flood protection; and environmental impacts to water and biological resources. All alternatives considered were determined to significantly impact cultural resources. Therefore, cultural resources were not included as a discriminating environmental criteria in the screening evaluation. The detailed results of the screening analysis are provided in Appendix C.

Subsequent to the initial planning, evaluation, and screening process, several alternatives for consideration were identified by cooperating and reviewing regulatory agencies. These alternatives were considered by MCB Camp Pendleton, but eliminated because they did not meet the purpose and need of the proposed action. A discussion summarizing the reasons for their elimination is also provided below.

Santa Margarita River Flood Control Project (P-010). Preliminary alternatives for the Santa Margarita River Flood Control Project (MILCON P-010) included a concrete lined channel, a soft bottom channel, an onbase detention dam, and an offbase detention dam. Also considered were

alternatives to the stormwater component of the project, including two different detention basins and a gravity channel. The following conclusions were based on the results of the screening analysis.

Concrete Lined Channel. A concrete lined channel to control water depth and flow velocity was evaluated based on construction with various channel lining materials and a range of channel bottom widths for normal water depth and 2.5 feet of clearance above water elevations of the 100-year flood. Based on these design considerations, the 100-year hydraulic characteristics and the estimated lining volume of the constructed channel were investigated to determine the water flow depths and flow velocities related to channel performance and construction costs. The results of this investigation indicated that the optimal lined channel would be a soil cement channel with a bottom width of 105 feet, a future 100-year flow depth of 23 feet, and flow velocity of 21 feet per second. The lined channel would require 95 acres for structures and flood control components.

The proposed concrete lined channel was eliminated from further consideration primarily because of potential environmental impacts to water and biological resources. Based on initial evaluation by MCB Camp Pendleton, and ACOE, it was determined that the impervious concrete lined channel would have adversely impacted recharge of the groundwater aquifer in the Lower Santa Margarita Subbasin. This subbasin provides from 60 to 70 percent of MCB Camp Pendleton's water supply. Another reason for its elimination was that construction of the concrete-lined channel would have resulted in the permanent loss of 95 acres of riparian habitat within the Santa Margarita River channel. In addition, the bridge at Basilone Road would have to be raised to clear the sides of the channel and thereby cause certain high profile vehicles to intrude into the runway approach-departure clearance zone at MCAS Camp Pendleton.

Soft Bottom Channel. The soft bottom channel would be constructed with an unlined (soft) bottom and soil-cement or riprap banks. The soil cement banks would provide additional structural stability to the riprap, which would require periodic replacement and restoration and the use of geotextile and gravel filter underlayers. A range of channel bottom widths (300 to 1,000 feet) and 1:1 side slopes were also evaluated.

The 100-year hydraulic characteristics and the estimated lining volume of the constructed channel were investigated to determine the water flow depths and flow velocities related to channel performance and construction costs. The results of this investigation indicated that the optimal lined channel would be a soft bottom channel with a bottom width of 300 feet, 100-year flow depth of 16 feet, and a flow velocity of 13 feet per second. The soft bottom channel would require 47 acres for associated structures and flood control components.

The proposed soft bottom channel alternative was eliminated from further consideration because it would not have minimized channel maintenance, and would have resulted in runway approach-departure clearance zone intrusion, and adverse environmental impacts to biological resources.

Based on initial evaluation by MCB Camp Pendleton and ACOE, the soft bottom channel would have required extensive and costly annual desilting and vegetative clearing operations to remove accumulated silt deposits and vegetation to prevent poor channel performance. In addition, the bridge at Basilone Road would have to be raised to clear the sides of the channel and thereby cause certain high profile vehicles to intrude into the runway approach-departure clearance zone at MCAS Camp Pendleton. The soft-bottomed channel would also have resulted in the permanent loss of 47 acres of riparian habitat within the Santa Margarita River channel.

Onbase Detention Dam. With this alternative, an onbase detention dam within a canyon upstream of the project reach would be used to regulate the water flow depths and flow velocities through the lower Santa Margarita River. The onbase detention dam would reduce the discharge conveyed downstream through the project reach. The detention dam would be sited approximately 6,500 feet upstream of the Lake O'Neill diversion structure. It would consist of a dam structure with a small outlet, a spillway, and a stilling basin. The height of the dam would provide protection for a 100-year flood event and water flow would be controlled through the outlet. In the event that floods exceed the 100-year peak volume characteristics, the water would pass over the spillway and into a downstream stilling basin. The detention dam would require 10 acres for associated structures and flood control components. However, the detention area behind dam would result in the potential inundation of over 500 acres.

The proposed onbase detention dam alternative was eliminated because MCB Camp Pendleton would not have received the flood protection needed for an extended period of time in order to construct the dam. In addition, the onbase detention dam would reduce groundwater recharge in the downstream portions of the Lower Santa Margarita River basin, and significantly impact biological resources from both construction and inundation by water held in the detention dam.

Offbase Detention Dam. Characteristics of an offbase detention dam would be similar to those of the onbase detention dam discussed in the preceding section. Additionally, the process associated with encroachment, acquisition, and condemnation of private property located off MCB Camp Pendleton would increase the economic costs and implementation time of this alternative. This alternative was evaluated and rejected under flood control alternatives in a *Basewide Water Requirement Availability Study*, concluding that a dam in De Luz Creek would inundate approximately 800 acres of riparian habitat and would not provide protection against long duration floods which might fill the reservoir flood control capacity before the peak flood arrives (Leedshill-Herkenhoff, 1989).

The proposed offbase detention dam was eliminated for many of the same reasons as the onbase detention dam. This proposed alternative would have time and cost constraints because the government would have needed to acquire property offbase. This would have lengthened the time frame required to approve and construct this alternative, leaving MCB Camp Pendleton and MCAS

Camp Pendleton without necessary flood control for a longer period of time. In addition, the onbase detention dam would reduce groundwater recharge in the downstream portions of the Lower Santa Margarita River basin, and significantly impact biological resources from both construction and inundation by water held in the detention dam.

Detention Basin North of Vandegrift Boulevard. With this alternative, a 162-acre detention basin north of Vandegrift Boulevard, adjacent to the STP No. 3 and west of the MCAS Camp Pendleton runway would be excavated as part of the stormwater management component of the Flood Control Project (P-010). The detention basin would collect and retain a portion of surface water runoff drainage based on a 100-year flood event occurring with a 24-hour storm event (a total volume of 437 acre feet with a peak discharge of 1,680 cfs).

The proposed detention basin north of Vandegrift Boulevard was eliminated because 162 acres of excavation would be required. This would have resulted in potentially significant impacts to riparian habitat, endangered species, and wetlands. It also would have resulted in possible groundwater contamination from interaction with IR sites in the project area.

Detention Basin South of Vandegrift Boulevard. This alternative would create a 74-acre detention basin located south of Vandegrift Boulevard in the western portion of the Chappo (22) Area. The detention basin would collect and retain a portion of surface water runoff; the peak runoff from the Chappo (22) Area drainage basin is 794 cfs and the total volume of storage requirement is 230 acre feet. This detention basin would include a dike along Vandegrift Boulevard and a mechanical gate installed to meter flow out of the detention basin. This detention basin would be implemented as part of the stormwater management system component of project P-010 consisting of a pump station.

The proposed detention basin south of Vandegrift Boulevard was eliminated for the same reasons as the detention basin north of Vandegrift Boulevard. It would result in 74 acres of excavation. This would result in negative impacts to biological resources and possible groundwater contamination.

Gravity Channel. The gravity channel alternative would be utilized as the stormwater management system, instead of the pump station, to discharge stormwater water runoff to the river using a gravity system. The gravity channel would cross the flood control structure and continue downstream along the west side of Vandegrift Boulevard as a concrete box culvert and then discharge into the river.

The gravity channel was eliminated from further consideration because it would not provide adequate hydraulic control of surface water runoff discharge without the use of the detention basin alternatives that were also eliminated from further consideration.

Basilone Road Bridge Replacement (P-030)

Hospital Road Alignment. The Hospital Road Alignment would provide a bridge crossing at a location upstream of the existing Basilone Road Bridge. At locations upstream of the existing bridge between the O'Neill Lake Diversion and the De Luz Canyon confluence, the Santa Margarita River narrows and has widths of approximately 500 feet. The Hospital Road Alignment would require a short bridge span of 500 feet across the river near the U.S. Naval MCB Camp Pendleton Hospital.

The Hospital Road Alignment would require major widening of Hospital Road and Santa Margarita Road to accommodate increased traffic (MCB Camp Pendleton Traffic Engineering Study, August 1995). In addition, this alignment would require the construction of approximately 1 mile of new road on the north side of the river to connect with Basilone Road. This new connector to Basilone Road would divide, segregate, and isolate two highly used training areas (Kilo Two and India) specifically designated for multiple MCB Camp Pendleton training activities. The type of training activities include, but are not limited to, artillery firing areas (AFA), Military Operations in Urban Terrain (Combat Town), small unit tactics, combat vehicle operations training, scouting and patrolling, compass and land navigation training, basic military skills training, control and maneuver of combat units up to brigade size, objective areas for heliborne operations and in-land maneuvering following amphibious operations (MCB Camp Pendleton Operations and Training Department, 1996).

The Hospital Road Alignment would minimize the required bridge span across the Santa Margarita River with only a 500-foot bridge length. According to the ACOE floodplain analysis, the Hospital Road Alignment bridge crossing was hydraulically preferred to the other alternatives. This alignment would not support MCB Camp Pendleton combat training operations. This new connector would divide, segregate, and isolate the Kilo Two Training Area from the India Training Area and would cause adverse impacts to the following training activities. A multiple lane road carrying hundreds of vehicles per hour would preclude low altitude paradrop operations into the Basilone Drop Zone due to aircraft safety considerations and prevailing winds. The new road would be within the surface danger zones of AFAs 23 and 24 which would end their use as AFAs. Tactical military training troop movement to and/or from the Kilo Two to the India Training Area would be forced into tactically unsound maneuvers when they cross the new road. Several "tank crossings" would be required on the connector road to allow for the passage of tracked vehicles. The new road would interfere with future training plans that include in-land maneuver and new firing ranges. The Kilo Two and India Training Areas are utilized by tens-of-thousands of Marines and other Armed Services members annually. Dividing, segregating, and isolating these two areas would deprive unit commanders of contiguous training areas, reduce flexibility in planning and executing training operations, and ultimately negatively impact combat readiness of their units.

While the bridge for the Hospital Road Alignment would not be located within the MCAS Camp Pendleton Approach-Departure Clearance Surface, it would lengthen the trip for motorists traveling from areas north on the Santa Margarita River and points south of the existing Basilone Road on Vandegrift by approximately 4.1 miles. This alignment would not provide a direct link between Basilone Road and Vandegrift Boulevard and would be less functional than other proposed bridge alignments.

The Hospital Road Alignment was eliminated because this alignment would disrupt and conflict with military training activities. This alignment would conflict with MCB Camp Pendleton and MCAS Camp Pendleton operations and mission.

Additional Alternatives Identified by Cooperating and Commenting Regulatory Agencies. Subsequent to the planning, evaluation, and screening process, several alternatives for consideration were identified by cooperating and reviewing regulatory agencies. These alternatives were considered by MCB Camp Pendleton and MCAS Camp Pendleton, but eliminated because they did not meet the purpose and need of the proposed action. A discussion of the additional alternatives and a summary of their reasons for elimination are provided below.

Relocate MCAS Camp Pendleton. MCAS Camp Pendleton has been in continuous use since 1942, and has evolved into an essential element of the Marine Corps aviation community in the west. The air station maintains and operates facilities to support several Marine units conducting training at MCB Camp Pendleton. The strategic location of the air station makes it an integral part of the MCB Camp Pendleton air-ground training system. The close proximity of MCAS Camp Pendleton to MCB Camp Pendleton live ordnance ranges allows flights to be conducted entirely over military land. Therefore, this proposed alternative was eliminated from consideration.

Relocate STP No. 3. STP No. 3 is an integral part of MCB Camp Pendleton and MCAS Camp Pendleton and their functional interrelationship as described above. Relocation of STP No. 3 would require unnecessary construction, adverse environmental impacts, and exorbitant expenditure of government funds.

Provide Flood Protection to Chappo (22) Area Separate From MCAS Camp Pendleton. As defined above, the relocation of MCAS Camp Pendleton was an alternative that was eliminated from consideration. As such, it is necessary to provide flood protection to MCAS Camp Pendleton. Combining flood protection for the Chappo (22) Area with flood protection for MCAS Camp Pendleton was a sound engineering decision and would result in less environmental impacts than providing separate flood protection for these two areas.

2.5 COMPARISON OF ALTERNATIVES

In accordance with NEPA, Table 2.5-1 provides a comparison of the alternatives and influencing factors of the construction, operations, and maintenance of the Flood Control Project (P-010) and the Basilone Road Bridge Replacement Project (P-030).

Influencing factors are project elements such as ground disturbance, structure footprint, construction corridor, trip generation, and employment that directly affect the environment. These influencing factors have been analyzed to determine their effects on the affected environment, described in Section 3.0. The impacts are described in Section 4.0, Environmental Consequences.

Table 2.5-1

Comparison of Alternatives

Influencing Factor	Levee Alignment 3 Stormwater Management: Pumphouse			Levee Alignment 1 Stormwater Management: Pumphouse			Levee Alignment 2 Stormwater Management: Pumphouse		
	Bridge Alignment A -Existing Alignment	Bridge Alignment B - East Curve	Bridge Alignment C - Rattlesnake Canyon	Bridge Alignment A Existing Alignment	Bridge Alignment B - East Curve	Bridge Alignment C - Rattlesnake Canyon	Bridge Alignment A - Existing Alignment	Bridge Alignment B - East Curve	Bridge Alignment C -Rattlesnake Canyon
Levee									
Length (feet)	16,800	16,800	16,800	16,585	16,585	16,585	15,200	15,200	15,200
Height (feet)	7-21	7-21	7-21	17-23	17-23	17-23	7-21	7-21	7-21
Width (feet)[A]	20-50	20-50	20-50	40-60	40-60	40-60	50	50	50
Stormwater System									
Pump Capacity (cfs)	1,000	1,000	1,000	500	500	500	500	500	500
Number/Size Pumps (#/hp)	6/400 & 2/200	6/400 & 2/200	6/400 & 2/200	6/200 & 2/100	6/200 & 2/100	6/200 & 2/100	6/200 & 2/100	6/200 & 2/100	6/200 & 2/100
Temporary Inundation Detainage Area (acres)	NA	NA	NA	68	68	68	68	68	68
Bridge									
Length (feet)[B] (# Sections/Bents)	1,155 (7)	1,375 (11)	2,000 (16)	1,155 (7)	1,375 (11)	2,000 (16)	1,155 (7)	1,375 (11)	2,000 (16)
Height (feet)	105	105	108-140	105	105	108-140	105	105	108-140
Piers	6	9	14	6	9	14	6	9	14
Ground Disturbance - Permanent (acres)	25	25	27	67	67	69	41	41	43
Levee[C]	18	18	18	51	51	51	16	16	16
Spur Dikes/Silt Fences	0	0	0	9	9	9	18	18	18
Bridge Approaches (North and South, ft.)	3,150	3,150	8,650	3,150	3,150	8,650	3,150	3,150	8,650
Ground Disturbance - Temporary (acres)	66	66	85	76	76	95	75	75	94
Levee	51	51	51	50	50	50	44	44	44
Spur Dikes/Silt Fences	0	0	0	11	11	11	16	16	16
Bridge and Roadway Approaches	15	15	34	15	15	34	15	15	34
Earthwork (cubic yards)	594,000	594,000	623,433	594,000	594,000	623,433	594,000	594,000	623,433
East Oscar Borrow Area (acres)	0	0	0	29	29	29	0	0	0
Chappo (22) Area Borrow Area (acres)	17	17	17	17	17	17	17	17	17
Construction Traffic (vehicle trips)	46,400	46,460	50,390	66,790	66,850	70,780	49,910	49,970	53,900
Construction Workers	150	150	150	150	150	150	150	150	150

Notes: [A] Levee width includes the total distance between the toe trench and the onboard drainage ditch. Width varies based on type of structure (i.e., earthen or floodwall) and flood protection design requirements.
[B] Bridge length does not include the roadway approaches. The roadway approaches, however, are included in the ground disturbance calculations.
[C] Includes earthen levee, floodwall, guide vanes, roadway realignments, and hillside grading as they apply to each conceptual project alternative.

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3.0 AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

3.1 GEOLOGY, SEISMICITY, AND SOILS

3.1.1 Definition of Resource

Geologic resources consist of the geomorphological features in the project area (i.e., the stream channel and floodplain, and the surrounding foothills, mountains, and coastal plain) and the underlying geologic formations and sedimentary cover, particularly in the stream valley. Seismicity includes the distribution of faults and the distribution and severity of seismic activity in the study area. Soil resources consist of the various soil series that form the surficial material, with consideration of their erodibility, permeability, and other relationships to hydrology and construction.

3.1.2 Geology and Floodplain Geomorphology

Geology. Marine Corps Base (MCB) Camp Pendleton is located within the coastal section of the Peninsular Ranges Geomorphic Province. This province is generally separated into two distinct geomorphic components: the northwest-trending mountain ranges, foothills, and intervening valley, which comprise the eastern and central portions of the province; and the coastal plain, which occupies the western portion. The coastal plain consists of numerous marine and non-marine terraces dissected by stream valleys.

Geologic units underlying the Lower Santa Margarita River Basin include Quaternary terrace deposits and alluvium; the Tertiary La Jolla and San Onofre formations; and rocks of the pre-Tertiary granitic/metamorphic basement complex. These geologic units are exposed along the margins of the basin and extend into the subsurface. Holocene and older alluvial deposits underlie the central portions of the basin. Most of the proposed project area is within the Santa Margarita River valley, which is underlain by unconsolidated younger (Holocene) alluvium with an average thickness of approximately 100 feet. Water wells in the alluvium are generally 100 to 150 feet deep. The hillside along the north side of the river valley is underlain by Quaternary river terrace deposits and granitic bedrock.

Floodplain Geomorphology. The Santa Margarita study reach extends from downstream of the Deluz Creek confluence to the Pacific Ocean. The channel is geologically confined to varying degrees throughout the study reach, particularly upstream of the O'Neill Lake diversion and in the narrows upstream of Stuart Mesa Road bridge. The channel sinuosity (length of channel to length of valley ratio) is 1.02, indicating that the river has few bends other than the broad bends that follow the general valley curvature (Northwest Hydraulic Consultants, 1997). Historic photographs and maps indicate that the river has not appreciably changed course since at least 1938. However, the

channel invert (the lowest point in a channel cross section) has migrated back and forth across a band of approximately 2,000 feet in width (Northwest Hydraulic Consultants, 1997).

Based on data recorded over a 50-year period, the invert profile of the river has varied over a narrow range. Although the maximum vertical variation over this time period is 10 feet, the annual variation is typically much less. Furthermore, there is no consistent trend in the elevation changes. Almost all locations indicate both upward and downward trends from 1946 to 1994, with the changes resulting mostly from seasonal differences in runoff.

Although the Santa Margarita River basin has undergone extensive urbanization and agricultural changes, and surface runoff is controlled throughout about half of the basin area by two upstream reservoirs, Vail Lake and Lake Skinner. The historical channel invert and river plan which form in the project area do not deviate far from a mean condition. Construction of roads, bridges, and levees on MCB Camp Pendleton have not significantly altered the river regime (Northwest Hydraulic Consultants, 1997).

3.1.3 Seismicity

The California Division of Mines and Geology (CDMG) classifies faults as either active or potentially active, according to the Alquist-Priolo Special Studies Zone Act of 1972 (California Division of Mines and Geology, 1990). A fault that has exhibited surface displacement within the last 11,000 years is defined as active. A fault that has exhibited surface displacement between 11,000 and approximately 1.6 million years ago is defined as potentially active.

The proposed project area is in Seismic Zone 4, but is not known to be directly underlain by any active or potentially active fault. There are several faults in the general region that could cause strong ground motion and associated secondary effects in the project area. Active faults within 60 miles of MCB Camp Pendleton and the seismic parameters for the faults most likely to affect the study area are summarized in Table 3.1-1.

The most significant credible seismic event likely to affect the project area would be an earthquake of magnitude 7.5 (Richter Scale) associated with the Offshore Zone of Deformation, approximately 12 miles offshore to the west. The Offshore Zone of Deformation is a component of the Newport-Inglewood/Rose Canyon Fault Zone. The estimated peak ground acceleration in the Camp Pendleton vicinity is about 0.3 gram (Kleinfelder Inc., 1997).

Table 3.1-1

Seismic Parameters for Major Active Faults Within 60 Miles of MCB Camp Pendleton

Major Active Faults	Distance from Fault to MCB Camp Pendleton (Miles)	Maximum Credible Earthquake (Richter Scale Magnitude)
Offshore Zone of Deformation	12	7.5
Rose Canyon	15	7.0
Whittier-Elsinore	17	7.5
Coronado Bank	30	6.75
Palos Verdes	38	7.0
Newport-Inglewood	39	7.0
San Jacinto	42	7.5
San Andreas	60	7.0

Source: Mualchin and Jones, 1992.

Earth mass movements such as landslides are not known to have occurred in the project area, although seismic activity could trigger landslides. However, the project area does not include significant earthmass or slopes that would likely experience failure or movement during a large seismic event.

3.1.4 Soils

Soils in the proposed project area were surveyed and mapped by the U.S. Department of Agriculture (USDA), Soil Conservation Service (SCS) (now the Natural Resources Conservation Service [NRCS]) in 1973 (Figure 3.1-1). Soils in the floodplain consist mostly of River Wash and Tujunga Sand. The low terrace on which the airfield and associated structures lie consists of Greenfield Sandy Loam and Visalia Sandy Loam. Nearby upland soils primarily consist of Fallbrook, Diablo, Visalia, Cienaba, Salinas, and Linne series soils (U.S. Department of Agriculture, Natural Resource Conservation Service, formerly Soil Conservation Service, 1973).

In general, soils encountered in borings drilled along the levee alignment consist of medium-dense and silty sands, with isolated layers of loose sand. Thin layers of silts are present in a few of the borings. The sands are generally well graded and vary from fine grained to medium coarse (Kleinfelder, Inc. 1997).

Because the floodplain supports fairly extensive riparian communities, soils within the floodplain have potentially hydric components. Hydric soils are those which have developed under sufficiently wet conditions to support growth and regeneration of hydrophytic vegetation. This type of soil is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the profile. Hydric soils in the project area may have inclusions where the hydric components are minor in extent. Onsite reconnaissance is required for verification. Soils in the general project area with the potential for hydric inclusions include the Huerhuero Loams, Las Flores Loamy Fine Sand, River Wash, Steep Gullied Land, Tujunga Sand, and Visalia Sandy Loam (U.S. Department of Agriculture, Natural Resource Conservation Service, formerly Soil Conservation Service, 1991). The River Wash, Tujunga, and Visalia series occupy most of the floodplain. These and some Greenfield Sandy Loams underlie proposed Detainage Area 1. Gaviota Fine Sandy Loam, Salinas Clays and Clay Loams, Visalia Sandy Loam, and minor areas of Las Flores Loamy Fine Sand underlie Detainage Area 2 (Chappo [22] Area).

Soil erosion potential by water is based on soil properties such as texture and structure. Soil properties determine the potential rate at which the soil can be eroded. Severe erosion problems can result in landscape changes and damage to structure foundations, as well as cause extensive siltation. The erosion potential is slight in clay soils that have slopes of less than 9 percent. Erosion is more severe in loamy sand or sands that have single-grained structures or slopes of more than 30 percent (U.S. Department of Agriculture, Natural Resource Conservation Service, formerly Soil Conservation Service, 1973). Water runoff erodes land and can undercut road embankments, landfills, and riverbanks. Eroded materials can fill reservoirs, ponds, and drainage ditches, and cause streams and rivers to sill with silt. The erodibility of soils is rated as either slight, moderate, or severe. A slight erodibility rating indicates that water erosion to soil is a minor problem and the soil is suitable for development if other factors are favorable. Ratings of moderate or severe erodibility indicate that water erosion is a problem and protective or corrective measures are necessary before and during use of the soil.

The alluvial soil of the Santa Margarita River floodplain is sandy with a single-grained structure and has the potential for severe erodibility provided the velocity of the river is sufficient. It consists of material that has been transported and is considered as sediment that is in a state of dynamic flux, resting during times of low river flow and moving during floods.


BASILONE
RIFLE RANGE ROAD


BASILONE ROAD
RATTLESNAKE CANYON RD
RIFLE RANGE ROAD
VANDEGRIFT BLVD
1000 0 1000 2000

Basemap Features

Hydrology Features

Roads, Parking, Airfield

Soil Classification

- Cienaba Sandy Loams
- Diablo Clays
- Fallbrook Sandy Loams
- Gavoita Fine Sandy Loams
- Greenfield Sandy Loams
- Huerhuero Loams
- Las Flores Loamy Fine Sand
- Linne Clay Loams
- Marina Loamy Coarse Sand
- Ramona Sandy Loâms
- Riverwash
- Salinas Clays and Clay Loams
- Steep Gullied Land
- Surface Water
- Terrace Escarpments
- Tujunga Sand
- Visalia Sandy Loam

Soils

Figure 3.1-1

3.2 HYDROLOGY AND WATER QUALITY

3.2.1 Definition of Resource

The hydrologic features associated with the project area include surface water drainage and flow and flooding potential. Water quality considerations include the quality of surface water and groundwater resources in the project area.

3.2.2 Hydrology and Flooding Potential

Surface Water Hydrology. The Santa Margarita River collects surface runoff from the Rancho California, Temecula, and Fallbrook areas, and conveys the water through Camp Pendleton to the Pacific Ocean. The Santa Margarita River has a tributary drainage area covering approximately 740 square miles, although many small tributaries are dry much of the year. MCB Camp Pendleton is located in the Lower Santa Margarita Basin, which is subdivided into the Upper Ysidora, Chappo, and Ysidora subbasins.

For most of the year, daily flow in the Santa Margarita River is largely dependent on upstream activity such as irrigation and releases of water from two upstream reservoirs: Vail Lake and Lake Skinner. Except for a few storm events each year, the hydrology of the river is dominated by low flow conditions. For the period of record from 1950 through 1993, discharge in the river exceeded 300 cfs less than 2 percent of the time, or an average of about 7 days per year.

Flooding Potential. Significant flooding occurred along the Santa Margarita River in 1916, 1927, 1937, 1938, 1943, 1969, 1978, 1989, and 1993. Floods in each of these years exceeded the 10-year flood magnitude. The 1993 flood is the largest on record and is considered to be a "63-year flood" event (U.S. Army Corps Of Engineers, 1994).

The 100-year flood is a discharge in a river that has a 1 percent probability of being equaled or exceeded in any given year. The Corps of Engineers (U.S. Army Corps Of Engineers, 1994) has estimated the future 100-year flood discharge in the Santa Margarita River to be 64,000 cfs. In addition to the 100-year flood event, other frequency discharges are often calculated to assess flooding potential. Other peak discharges developed by the Corps of Engineers (U.S. Army Corps of Engineers, 1994) for the Santa Margarita River are shown in Table 3.2-1.

The U.S. Army Corps of Engineers (ACOE) HEC-2 computer model was used to predict water surface elevations for all the flood discharge values shown in Figure 3.2-1. This analysis assumes the existing levee remains in place and is not breached during the flood. The analysis shows that even if the levee remains in tact during the storm, partial flooding of the runway would occur. Since

Table 3.2-1

Peak Discharges Used in this Study

Exceedence Interval (years)	Future Conditions Peak Discharge (cfs)
2	3,000
5	9,400
10	17,000
25	31,500
50	46,000
100	64,000

the 1993 storm, an event lesser in magnitude than the 100-year flood, caused a breach of the levee, it is unlikely that the current temporary levee would retain its structural integrity during a greater storm. Therefore, it is likely that the 100-year flood would actually cause significantly more flooding than that shown in Figure 3.2-1.

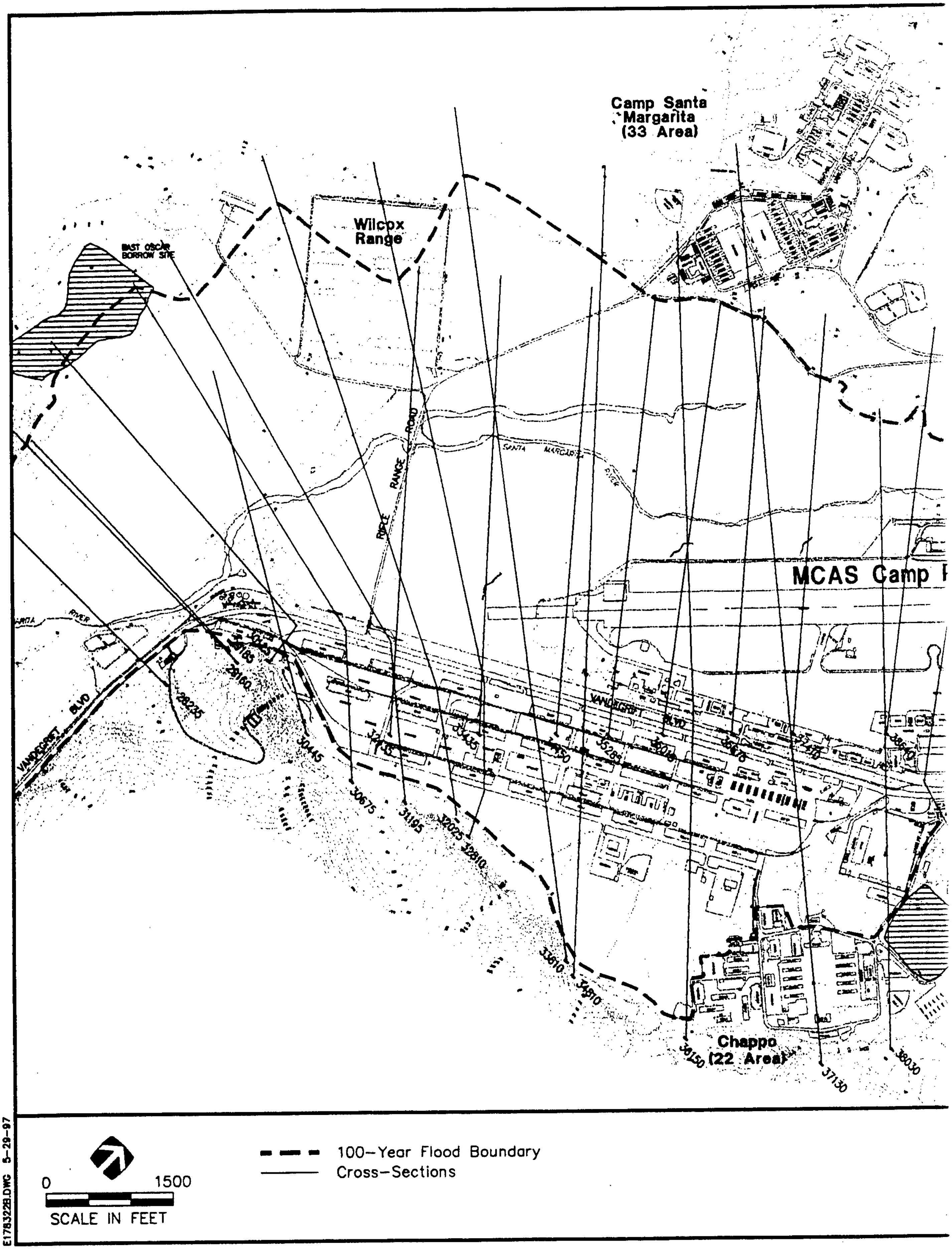
3.2.3 Water Quality

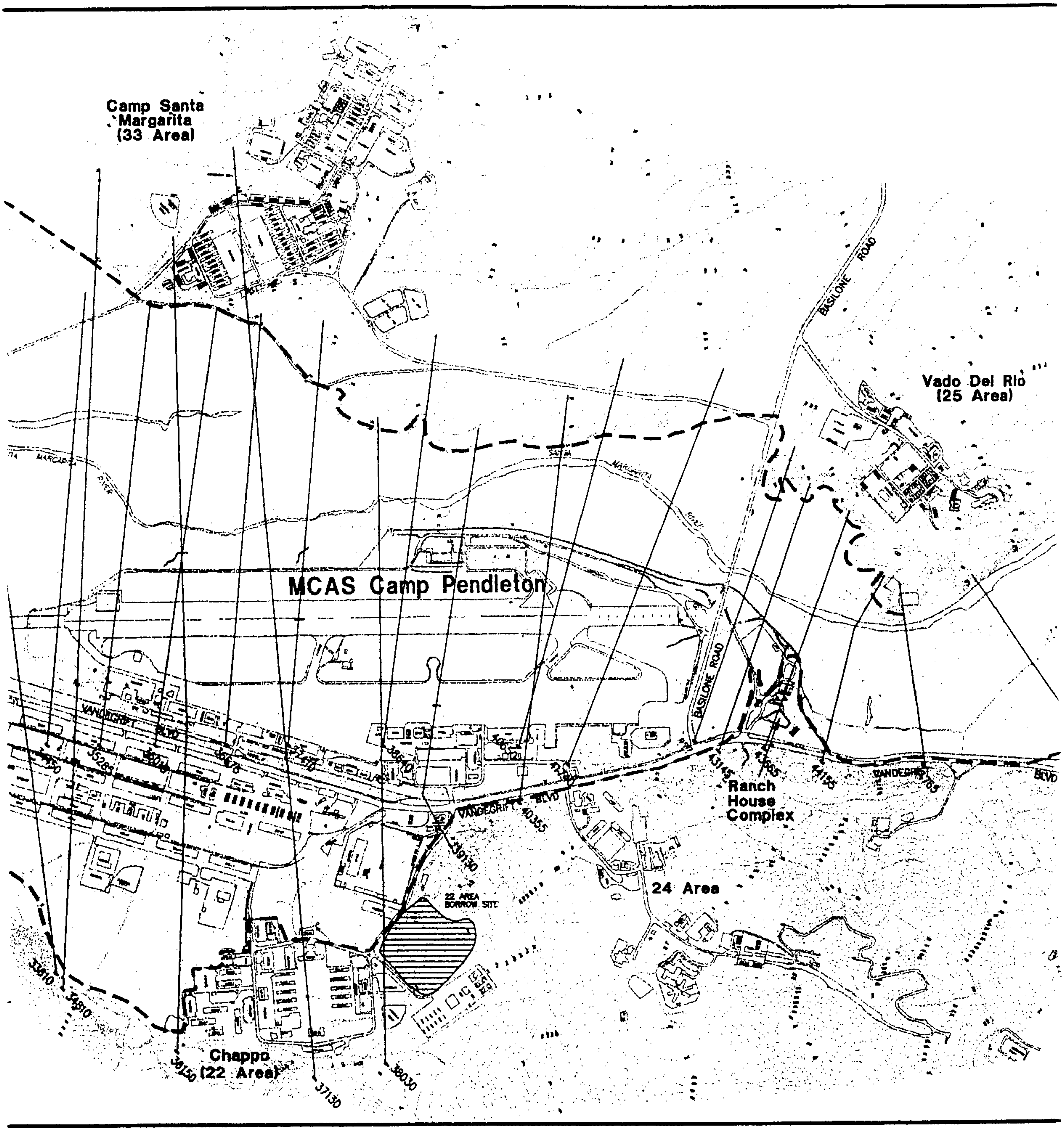
Surface Water Quality. Through most of its course and during normal flows, the Santa Margarita River has moderate water quality with total dissolved solids (TDS) levels averaging 700 to 900 milligrams per liter (mg/l). Offbase agricultural activity upstream can contribute to elevation of both TDS and nitrate levels. Surface water quality varies seasonally, with higher TDS levels occurring during the dry season.

Currently, sheetflow of rainfall from north of the centerline of the runway flows into the Santa Margarita River. This may allow for the introduction of contaminants from the runway and may contribute contaminants of concern into surface water. Sheetflow from south of the centerline of the runway passes through an oil/water separator and into an earthen channel.

Groundwater Quality. The entire MCB Camp Pendleton water supply is extracted from water well fields from groundwater basins in the Santa Margarita, Las Flores, San Oñofre, and San Mateo watersheds. The lower Santa Margarita River basin provides 70 percent of the base's water needs, and supports all but one of the service areas at the south end of MCB Camp Pendleton.

The Santa Margarita drainage basin is divided into the Upper and Lower Basins. MCB Camp Pendleton lies within the Lower Basin which is further divided into three subbasins. The Upper


Camp Santa Margarita (33 Area)
Wilcox Range
EAST OSCAR BORROW SITE
RIFLE RANGE ROAD
SANTA MARGARITA RIVER
MCAS Camp P
VANDEGRIFT BLVD
Chappo (22 Area)
28185
28160
28235
30445
30675
31195
32025
32810
33610
34610
36150
37130
38030
100-Year Flood Boundary
Cross-Sections
0
1500
SCALE IN FEET
E178322B.DWG 5-29-97


Camp Santa Margarita (33 Area)
Vado Del Rio (25 Area)
MCAS Camp Pendleton
BASILONE ROAD
VANDEGRIFT BLVD
Ranch House Complex
24 Area
22 AREA BORROW SITE
Chappo (22 Area)
33610
34810
36150
37130
38030
39130
40355
43145
44155

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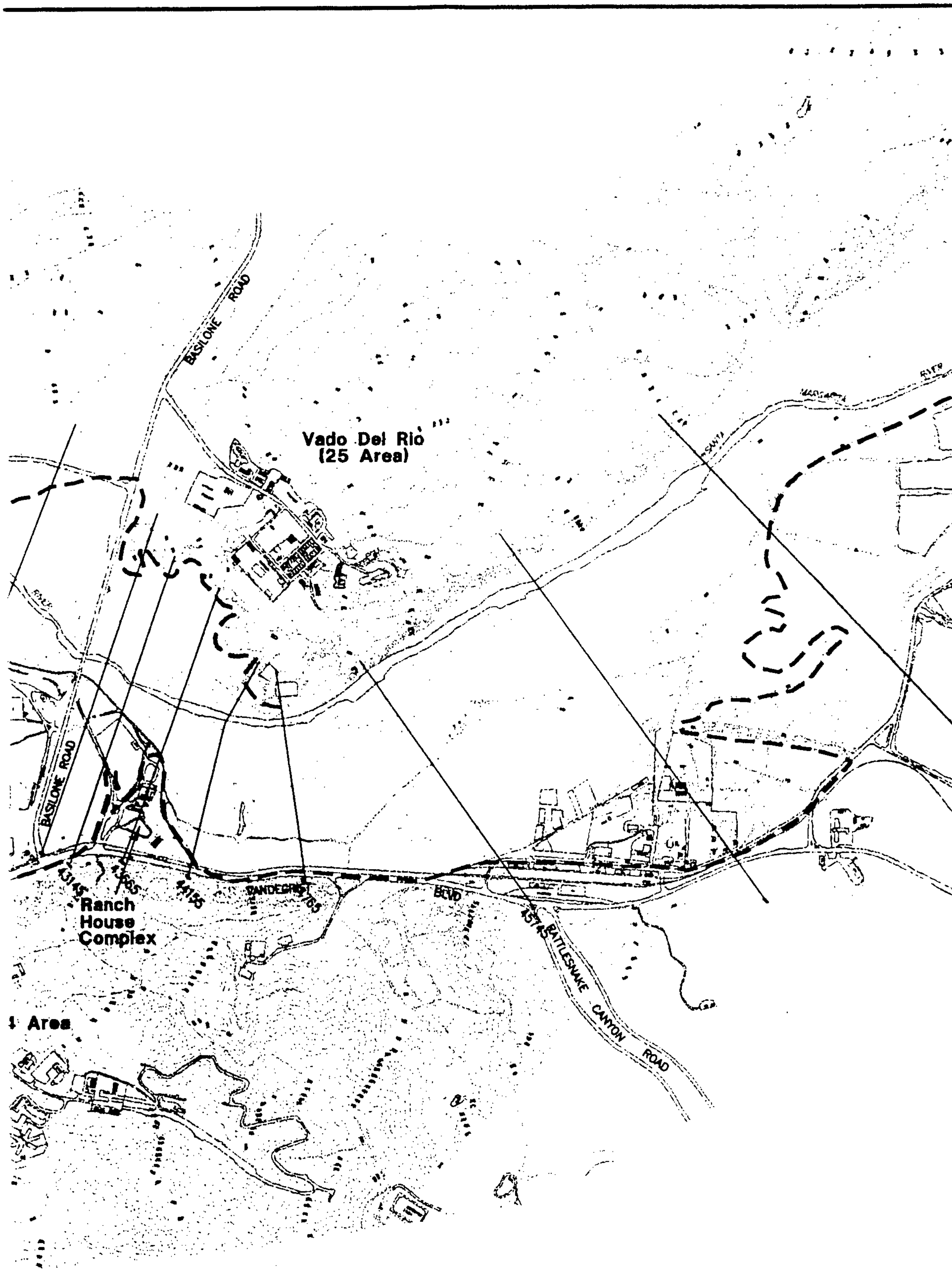


100-Year Flood Inundation
Existing Conditions

Figure 3.2-1

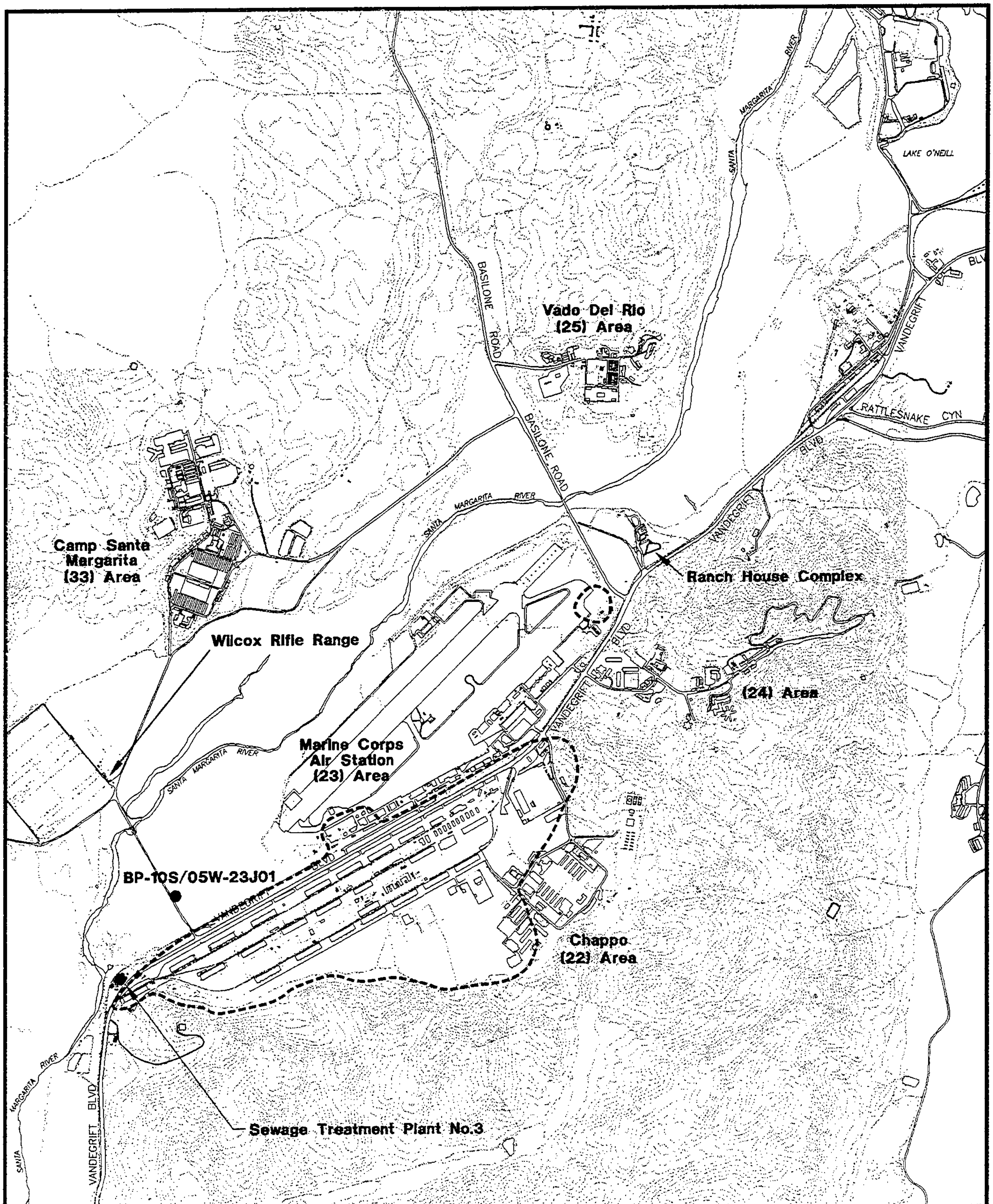
Ysidora subbasin extends from the eastern/northeastern base boundary to Basilone Road, the Chappo subbasin extends from Basilone Road to the narrows below MCAS Camp Pendleton, and the Ysidora subbasin extends southeast to the Santa Margarita River estuary near its mouth. Average TDS from groundwater produced from nine existing wells in the Chappo and Upper Ysidora subbasins ranged from 574 to 749 mg/l with individual readings ranging from 416 to 1,028 mg/l (Law/Crandall, Siting Study for Water Supply Test Wells; Page 16, February 9, 1994). All average TDS from these wells exceed the recommended California maximum contaminant level (MCL) of 500 mg/l, but none exceed the upper MCL of 1,000 mg/l. Two wells, one of which is not a potable water supply, have exceeded the upper MCL in individual measurements of TDS. Review of construction details for these wells indicates that they were completed in the fine-grained member of the Upper Alluvium, a likely source of poor quality water.

Manganese has exceeded California secondary drinking water standards in groundwater from the Chappo and Upper Ysidora subbasins (Law/Crandall, 1994, 1995). High levels of manganese are commonly found in areas with organic layers.

A number of contaminated sites on MCB Camp Pendleton and MCAS Camp Pendleton have been designated Installation Restoration Program (IRP) sites. Contaminant plumes containing organic hydrocarbons, primarily consisting of trichloroethene, 1,1-dichloroethane, 1,2-dichloroethane, and vinyl chloride have been mapped in areas which lie east of STP No. 3 and south of the airfield. Areas of identified groundwater contamination are shown on Figure 3.2-2.

The main plume is located upgradient of the three production wells which provide the water supply to the area. However, the plume has not impacted the production wells to date, and it is considered unlikely that it ever will. IRP modeling has resulted in a preliminary determination that the plume will degrade to below detection limits over the next 30 years, and that migration of contaminants which exceed detection limits will not reach the nearest down-gradient production well. However, the wells are located on the opposite side of the Santa Margarita River away from the plume. Should contamination reach the river, it would probably be directed downstream away from the wells.

Trihalomethanes (THMs) are organic constituents that form when water with organic carbon is chlorinated. THMs have been detected at concentrations near or above the MCLs in existing water wells (Law/Crandall, 1994). Samples showing high THM levels were taken after the point of chlorination; samples taken before the point of chlorination show THMs at low or nondetectable concentrations indicating chlorination of the water is producing THMs.



LEGEND

Areas of Known or Suspected Groundwater Contamination

Areas of Known or Suspected Groundwater Contamination

Figure 3.2-2

Near the coast, seawater has intruded into the river's estuarine lagoon, and total dissolved solids (TDS) concentrations are higher there. Degradation from saltwater intrusion has not affected the groundwater system as far up as the project area, and it is not anticipated that degradation of water quality from the ocean will be a problem in the project area.

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3.3 BIOLOGICAL RESOURCES

3.3.1 Definition of Resource

The existing biological resources identified in the proposed project area are discussed in this section. Background information was obtained from the following documents: *Biological Assessment Riparian and Estuarine Habitat Marine Corps Base Camp Pendleton* (Marine Corps Base Camp Pendleton, 1994) and *Biological Resources of the Santa Margarita River Drainage Status Reports 1* through *4* (Tetra Tech, Inc., 1995a, 1995b, 1995c, and 1996a). The Biological Assessment includes a discussion of the riparian habitats which exist throughout MCB Camp Pendleton and within the Santa Margarita River Basin. Status Reports 1 through 4 assessed the biological resources of a study area encompassing the floodplain from the Pacific Ocean upstream to Lake O'Neill. The study area was later reduced to the area below Sewage Treatment Plant (STP) No. 3 upstream to Lake O'Neill. Results of specific previous and ongoing biological studies and surveys undertaken primarily by MCB Camp Pendleton were accessed and summarized in the Status Reports. The following section describes those biological resources in the reduced project area.

There exists a large literature that documents the presence of a highly varied flora and fauna aboard MCB Camp Pendleton, and which indicates the high biological value of the Santa Margarita River. A substantial portion of this literature has been produced by personnel from federal agencies such as the U.S. Fish and Wildlife Service (USFWS) (for example, see Zembal, in Schoenherr, 1989 for a summary of habitat composition and breeding birds of the riparian communities along the Santa Margarita River). In addition, MCB Camp Pendleton has devoted considerable time and resources studying species in riparian, estuarine and upland habitats. For years the Base has conducted inventories and studies of its sensitive species, and continues to do so. Final reports of concluded studies, and progress reports of ongoing or in-progress reports are maintained by MCB Camp Pendleton Environmental Security. The following list of studies is intended to illustrate the types of information that has been gathered concerning the biological resources of the project area. The results of these investigations were accessed and evaluated, especially those involving threatened and endangered species, for use in the analysis of project impacts presented in Section 4.3. It is not the intent of this environmental review document to present the results of these studies. Biological investigations conducted aboard MCB Camp Pendleton by the Environmental Security personnel, the USWFS, or contract biologists include annotated checklists of the general birds of the Santa Margarita River (Zembal, Daniels, Bontrager and Scott, 1982; Unitt, 1995); focused studies on sensitive birds such as least Bell's vireo (U.S. Fish and Wildlife Service, 1994a, 1993; Sweetwater Wildlife Biologists, 1993; Griffith and Griffith, 1990a, 1990b, 1992; Jones, 1989; Salata, 1987a, 1987b, 1986, 1984,1983, 1982, 1981), coastal California gnatcatcher, cactus wren, white-shouldered kite and grasshopper sparrow (Atwood, 1984, 1985; U.S. Fish and Wildlife Service, 1991), California least tern (Belluomini, 1994, 1992, 1991a, 1991b, 1990, 1988; Keane, 1988; Minsky,

Keane and White, 1985, 1984, 1983), Belding's savannah sparrow (U.S. Fish and Wildlife Service, 1985), western snowy plover (U.S. Fish and Wildlife Service, 1992), raptors (Bloom, 1991, 1983); focused studies on sensitive reptiles (McGurty, 1981a,b; Holland, in progress); focused studies on sensitive fish such as tidewater goby (Swift, Baskin and Haglund, 1994; Holland, 1992), focused studies on sensitive mammals such as Stephens' kangaroo rat (Tetra Tech, Inc. and SJM Biological Consultants, 1996; Beauchamp, 1984; Friesen, 1993; Grout, 1992; McClenaghan, 1994, 1996; Montgomery, 1994; O'Farrell, 1992; and Ogden Environmental and Energy Services, 1994, 1995) and Pacific pocket mouse (U.S. Fish and Wildlife Service, 1994b). In addition, habitats aboard MCB Camp Pendleton were included in range-wide surveys of certain sensitive species including Belding's savannah sparrow (James and Statlander, 1991), and California least tern (Johnston and Obst, 1992). Because of the large amount of biological information available, the focus of this environmental document was to evaluate the project impacts to sensitive species (based on past and on-going yearly investigations), and to describe the general biological resources of the project area or Santa Margarita River in great detail.

3.3.1.1 Regional Context of the Santa Margarita River

The Santa Margarita River contains a relatively high quality, biologically intact riparian corridor. This riparian corridor is important in a regional context for several reasons. Within the southern California coastal region, the Santa Margarita River: provides a variety of habitats which results in a rich biological diversity; supports relatively large numbers of threatened, endangered, and sensitive wildlife species; maintains wetlands functions and values which results in highly productive biological communities; and maintains a viable wildlife corridor and habitat connectivity.

The Santa Margarita River supports high quality biological resources and represents a valuable aquatic system due to its hydrologic characteristics and performance of hydrogeomorphic functions. The following discussion is summarized from a report which evaluates the waters and wetlands functions of the Santa Margarita Watershed (L.C. Lee & Associates, 1994). The Santa Margarita River can be conceptually divided into three functional segments including the steep, rocky, confined channel through Temecula Canyon to the confluence with DeLuz Creek; the broad flatter reaches from DeLuz Creek through MCB Camp Pendleton to the upward extent of tidal influence, and the estuary formed as the river flows into the ocean. The canyon portion of the river is relatively hydrologically simple, and the rocky substrate supports many pools for long-term storage of water. These pools are not instrumental in reduction of peak flows nor do they contribute to recharge of deep subsurface water storage. Woodland plant communities are peripheral through the canyon, due to the large volume of water which occasionally moves down the channel.

Between Temecula Canyon and the Santa Margarita estuary (the segment which includes the project area), the river is hydrologically and biologically complex. The primary channel is shallow and wide,

while the floodplain is broad with a network of levees, terraces, bars, backwater sloughs, secondary channels, and pools. These sloughs, secondary channels, and pools become active flow and storage areas during yearly high flows, and absorb peak flows and maintain structural diversity of the associated riparian habitat.

The lowest reaches of the river are directly and indirectly tidally influenced and include saline, brackish, and freshwater estuarine wetlands.

Hydrogeomorphic functions tend to be performed differently within each of the three segments identified above. Relative to dynamic surface water storage, within the Temecula Canyon segment this occurs primarily within rocky pools. The middle segment contains structural elements within the channel which hold water during high flow events, as mentioned above. Also, the floodplain is available to receive overbank flows. In the estuarine segment the dynamic surface water storage function is less important, and relatively little storage area is present.

Relatively little long-term surface water storage capacity is present within the canyon segment. The middle segment contains features which provide a high degree of long-term surface water storage. The tidally affected segment can also provide long-term storage. Little subsurface water storage occurs in the canyon segment, while the middle segment provides subsurface storage capacity due to the large amount of sand and gravel within the channel and floodplain. Subsurface storage in the tidal influenced area is negligible.

Relative to velocity reduction, moderately high flows through the canyon segment can be slowed by large boulders. Below DeLuz Creek, velocity reduction is performed by in-stream elements and riparian vegetation during moderately high flows, and by overbank flows occupying the floodplain during extreme events. The single most effective mechanism for velocity reduction in the estuarine segment is discharge into the ocean. No moderation of groundwater flow occurs along the canyon segment since lateral wetlands are absent. In the middle section, lateral wetlands are present, but this function is not generally considered to be influential in large depositional rivers. Little or no moderation of groundwater flow occurs in the estuarine segment.

As discussed above, the Santa Margarita River represents a relatively healthy riverine system, in terms of both performance of hydrogeomorphic functions and maintenance of diverse and highly productive (biologically) wetland, estuarine and riparian habitats. However, the river has been affected by land use and development within the watershed, which has resulted in sedimentation in the channel and on the floodplain. As a result, both water quality and floodplain function have been compromised. Flood peaks and quantities of sediments moving down through the watershed have increased.

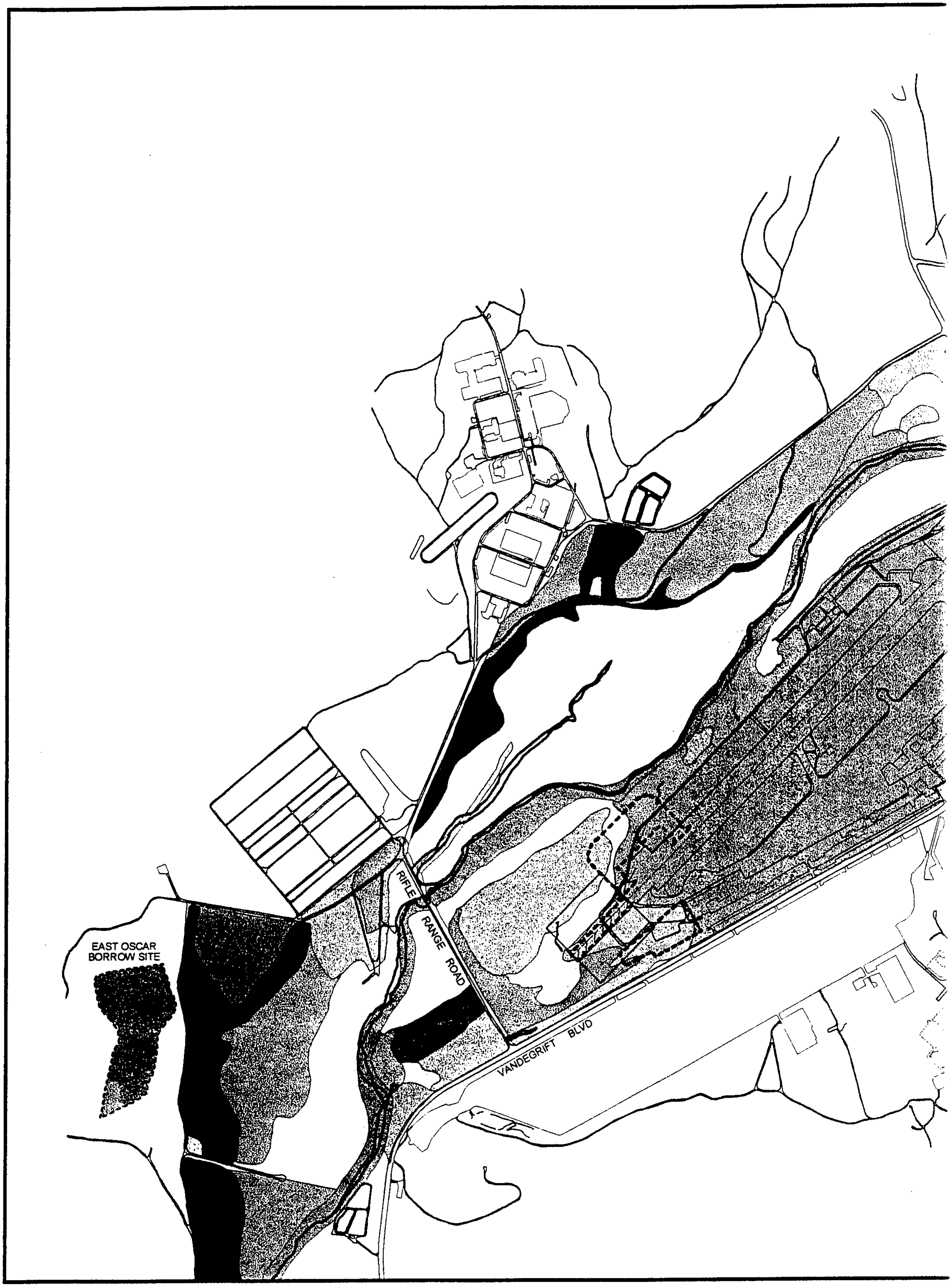
3.3.2 Vegetation and Habitat Types

The vegetation types located in the project area are described below, and their distributions are shown on Figure 3.3-1. For consistency, this environmental document uses the vegetation classification contained within the Biological Assessment produced by MCB Camp Pendleton (1994). Vegetation was mapped from aerial photographs, dated 1994 and 1995. Limited field truthing was conducted, and biologists from MCB Camp Pendleton provided input to refine initial vegetation mapping efforts. The pattern of vegetation within the Santa Margarita River floodplain is dynamic, in that distribution is changed during extreme flow events. In addition, the vegetation naturally forms a mosaic of closely-related types. The vegetation mapping presented in this document provides information on the distribution of vegetation within the project area. However, relatively small inclusions of vegetation within a larger community may not be reflected.

Freshwater Marsh. Freshwater marsh occurs in wetlands that are permanently flooded by standing freshwater lacking a substantial water current. Prolonged saturation of such areas permits the accumulation of deep peaty soils. Characteristic freshwater marsh species include woolly sedge, yellow nutsedge, cattail, bulrush, and southern mudwort. Common and characteristic wildlife species occurring in freshwater marsh habitat include Pacific treefrog, great blue heron, American coot, mallard, cinnamon teal, redhead, marsh wren, common yellowthroat, and red-winged blackbird.

Riparian Scrub. This shrubby community typically occurs on coarse alluvial soils in intermittent streambeds and on floodplains. It is generally not diverse, typically being dominated by mulefat, and often maintained by frequent flooding. Riparian scrub vegetation represents an early seral stage in the development of woodlands dominated by Fremont cottonwood or willows. Other characteristic riparian scrub species include blue elderberry, narrow-leaved willow, arroyo willow, and dwarf nettle. Common and characteristic wildlife species occurring in riparian scrub habitat include western toad, western fence lizard, western wood pewee, Pacific-slope flycatcher, black phoebe, western tanager, black-headed grosbeak, Lazuli bunting, spotted towhee, song sparrow, and brush rabbit.

Riparian Woodland. This vegetation community is characterized by several species of willow, (including Goodding's black willow, narrow-leaved willow, and arroyo willow), as well as scattered individuals of Fremont cottonwood, coast live oak, western sycamore, and blue elderberry. Generally, there is a dense canopy and herbaceous shrubby understory. Soils are typically loose, sandy, or fine gravely alluvium deposited near stream channels during flood flows. Common and characteristic wildlife species occurring in riparian woodland habitat include Cooper's hawk, red-shouldered hawk, Nuttall's woodpecker, downy woodpecker, Hutton's vireo, scrub jay, Swainson's thrush, Bewick's wren, bushtit, orange-crowned warbler, yellow warbler, and common raccoon.


EAST OSCAR
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RANGE
ROAD
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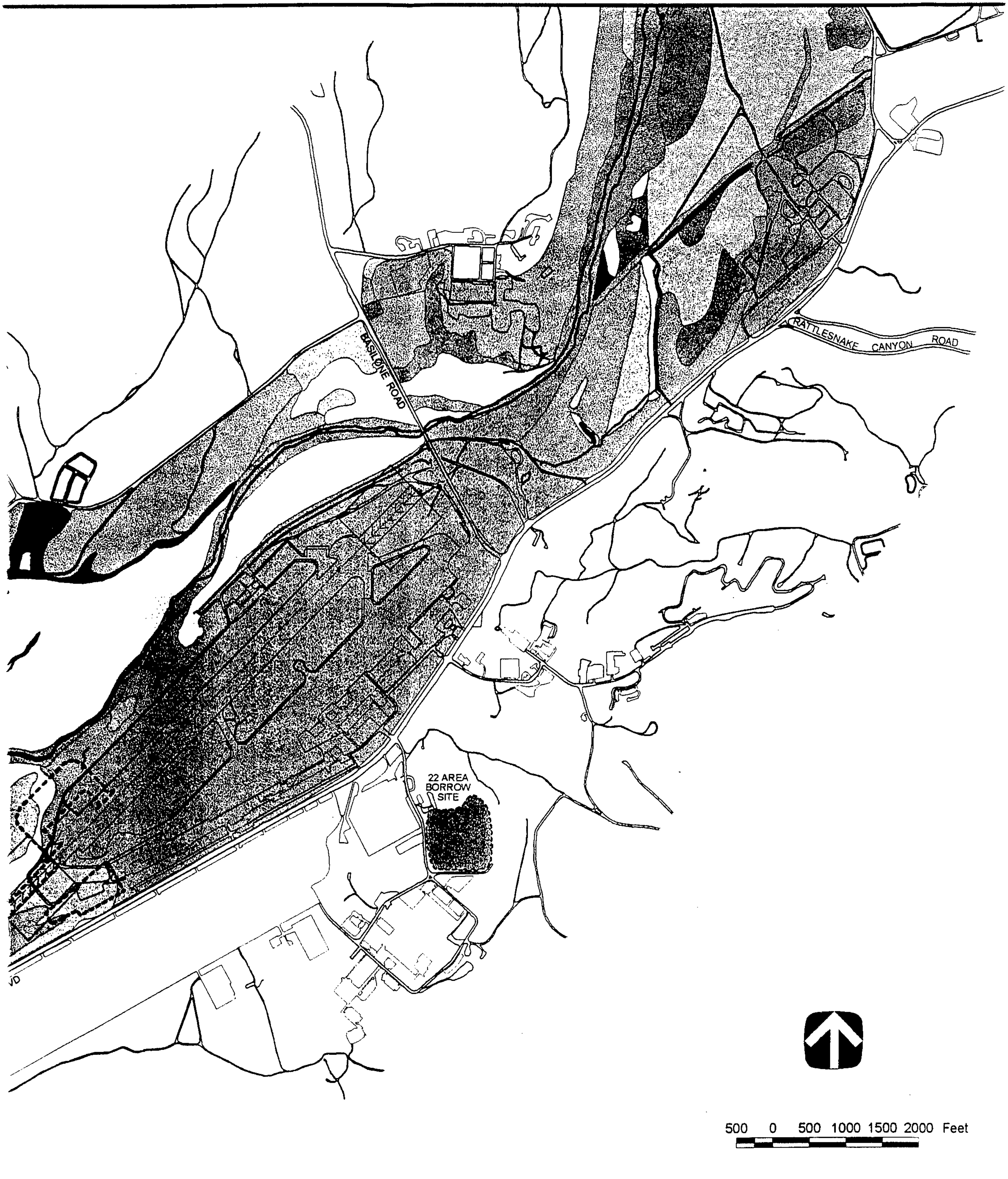
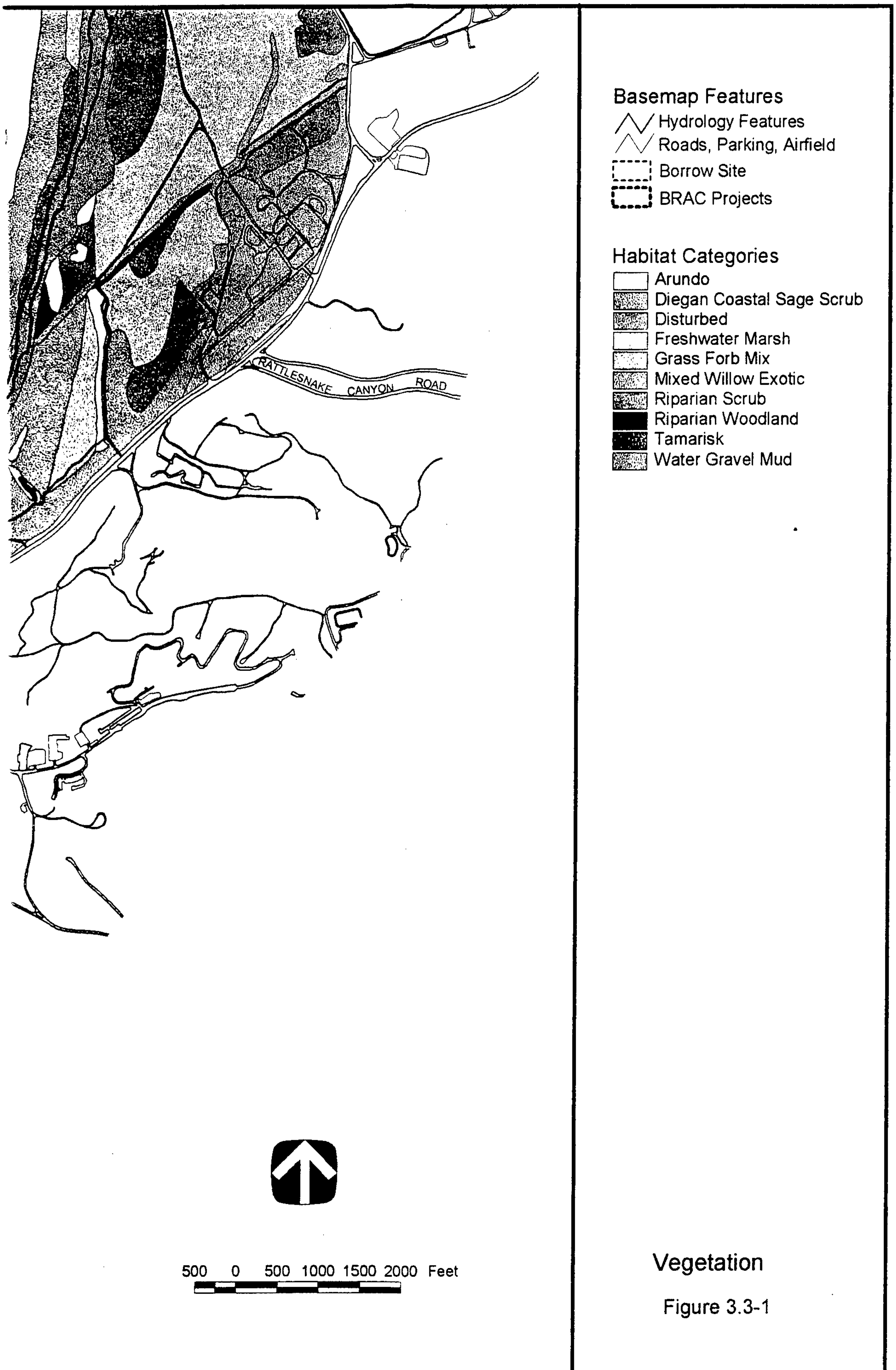

RATTLESNAKE CANYON ROAD
BASILONE ROAD
22 AREA BORROW SITE
500 0 500 1000 1500 2000 Feet



Vegetation

Figure 3.3-1

Mixed Willow Exotic. This community contains less than 70 percent willows with large percentages of exotic plants. Other characteristic plant species occurring in these areas include giant reed, tamarisk, blue elderberry, and mulefat. Common and characteristic wildlife species occurring in the mixed willow exotic habitat are similar to those in riparian scrub habitat, but not likely as diverse. It is differentiated from Arundo dominated vegetation (see below) in that it contains a predominance of native species. However, it may contain up to 30 percent Arundo.

Tamarisk Dominated. This vegetation community contains greater than 70 percent tamarisk. Like giant reed, tamarisk is an aggressive exotic that has become established along several of the drainages on MCB Camp Pendleton. This vegetation provides very little wildlife habitat.

Arundo Dominated. This vegetation community contains greater than 70 percent giant reed. This invasive exotic has become established in large stands along the major waterways of MCB Camp Pendleton. It is an aggressive weed and generally out-competes the native vegetation, thereby reducing habitat quality for several listed species and providing little to no value to native wildlife. It is differentiated from mixed willow exotic vegetation (see above) in that it contains a predominance of non-native Arundo. However, it may contain up to 30 percent native species, including the willows which also are a component of mixed willow exotic.

Open Water, Gravel, and Mud. This community encompasses nonvegetated or very sparsely vegetated areas, including sand and gravel washes, mud banks, and open water. These areas are important to the overall ecology of the basin by providing foraging and nesting areas for certain bird species (such as killdeer, belted kingfisher, and white-throated swift), and habitat for amphibians.

Grass-Forb Mix. This vegetation community includes such characteristic species as mustard, non-native annual grasses, fennel, goldenbush, and others. This community occurs on the higher and drier islands in the center of washes, along the banks, and in disturbed areas. Common and characteristic wildlife species occurring in grass-forb mix habitat include side-blotched lizard, gopher snake, mourning dove, horned lark, house finch, western meadowlark, California ground squirrel, and Botta's pocket gopher.

Diegan Coastal Sage Scrub. Diegan coastal sage scrub is characterized by low-growing drought tolerant shrubs with an understory of annual and perennial herbs, and perennial and annual grasses. The habitat is dominated by California sagebrush, monkeyflower, black sage, and California buckwheat. Other common and characteristic plants within this community include sugar bush, coyote brush, encelia, and white sage. The understory of this habitat is dominated by annuals and grasses such as bromes, California everlasting, blue-eyed-grass, and camissonia. This habitat occurs along the fringe of the floodplain and encroaches into the floodplain at several locations. Common and characteristic wildlife species occurring in Diegan coastal sage scrub habitat include southern

alligator lizard, California whipsnake, western rattlesnake, greater roadrunner, California quail, California thrasher, lesser goldfinch, loggerhead shrike, deer mouse, and California pocket mouse.

Disturbed/Developed. The disturbed/developed classification includes areas on which the native vegetation has been substantially altered by agriculture, construction, or other land clearing activities. Disturbed areas are typically located in vacant lots, roadsides, construction staging areas, and abandoned agricultural fields, and are dominated by non-native annual grasses and perennial broadleaf plant species. Characteristic invasive plant species occurring on disturbed sites and detected in the project area include black mustard, fennel, Russian thistle, curly dock, Bermuda grass, and Australian saltbush. Developed lands include buildings, parking lots, other paved areas, and roads.

3.3.3 Sensitive Species

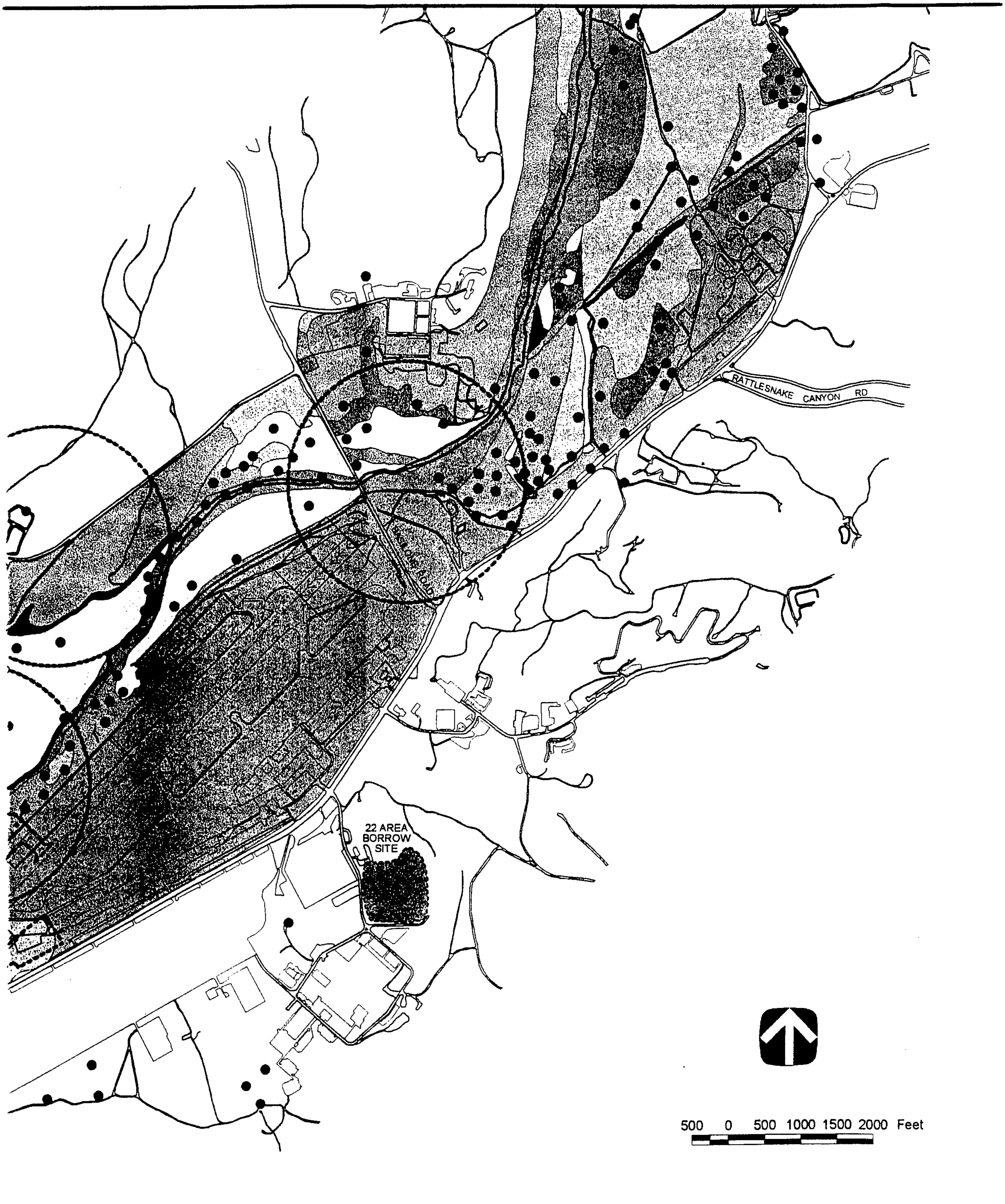
Locations of sensitive species within the projectarea are shown on Figure 3.3-2. Plant and wildlife species observed during the year-long field reconnaissance as well as during past surveys are included in Appendix B of the Status Reports (Tetra Tech, Inc., 1995a, 1995b, 1995c, 1996a). Numerous sensitive species are known to occur on MCB Camp Pendleton, and several were observed during the 1995-1996 surveys (Tetra Tech, Inc., 1996a). However, not all of these species would be expected to occur in the floodplain of the Santa Margarita River within the project area. Those sensitive wildlife species known from the region but not expected to occur within the project area are considered briefly in the discussion, and then are no longer considered in the document. These species are not expected to be impacted by the proposed project and include tidewater goby, brown pelican, California least tern, western snowy plover, and Belding's savannah sparrow, as well as other federal species of concern. Two small mammal species evaluated for potential to occur at one of the proposed borrow sites and uplands associated with the Basilone Bridge project are discussed below, even though their presence in the project area is unlikely. A survey has been conducted at MCB Camp Pendleton to include the project area for Steel Head Trout. None were found. Additionally, although none have been found, monitoring for the Quino Checkerspot Butterfly will occur for one more year at MCB Camp Pendleton. The sensitive plant and wildlife species known to occur within the Santa Margarita River floodplain but not within the project area are discussed in Sections 2.3 and 2.4 of the Status Reports, while sensitive species potentially occurring within the entire Santa Margarita River floodplain are discussed in Appendix A of the Status Reports. Sensitivity status designations are defined in Table 3.3-1.

Listed Species Known to Occur

Least Bell's Vireo
Sensitivity Status: FE, CE

The least Bell's vireo (vireo) was listed as an endangered species by the USFWS in May of 1986. The vireo arrives in southern California from mid-March to early April and leaves for its wintering


EAST OSCAR
BORROW SITE
RIFLE RANGE ROAD
VANDEGRIFT BLVD


RATTLESNAKE CANYON RD
22 AREA
BORROW
SITE
500 0 500 1000 1500 2000 Feet

Species
- Southwestern Flycatcher
- Least Bell's Vireo
- Arroyo Southwestern Toad (500M Buffer)

Basemap Features
- Hydrology Features
- Roads, Parking, Airfield
- Borrow Site
- BRAC Projects

Habitat Categories
- Arundo
- Diegan Coastal Sage Scrub
- Disturbed
- Freshwater Marsh
- Grass Forb Mix
- Mixed Willow Exotic
- Riparian Scrub
- Riparian Woodland
- Tamarisk
- Water Gravel Mud

Sensitive Species

Figure 3.3 - 2

Table 3.3-1

Sensitivity Status Designations

Federal Species Designations (U.S. Fish and Wildlife Service, 1996)
FE = Federal Endangered species FT = Federal Threatened species FSC = Federal Species of Concern (previously Category 2 federal candidate species)
State Listed Species (California Department of Fish and Game, 1994)
CE = California Endangered species CT = California Threatened species CSC = California Species of Special Concern CFP = California Fully Protected, Fish and Game Code

ground in southern Baja California in August. Typical habitat for vireos includes willow dominated riparian habitats with a lush understory. Vireos forage primarily in willows. However, where habitat is narrow, they will forage in uplands at the edge of riparian habitat. It has been estimated that the riparian habitat within the Santa Margarita River floodplain could support at least 300 breeding pairs of least Bell's vireos. Approximately 225 breeding pairs were observed within the Santa Margarita River watershed in 1994, with 110 of those documented pairs within the project area (Marine Corps Base Camp Pendleton, 1994); while data for the 1995 breeding season indicated 461 pairs of least Bell's vireos bred within the Santa Margarita floodplain (Tetra Tech, Inc., 1996a). According to 1996 data, approximately 492 breeding pairs were observed within the Santa Margarita River watershed, with about 287 vireo pairs present within the general project area.

Southwestern Willow Flycatcher
Sensitivity Status: FE, CE

The southwestern willow flycatcher (flycatcher) breeds only in riparian wetland thickets, usually along major rivers or drainages of southern California, Arizona, Utah, Nevada, New Mexico, and Texas. The largest remaining population in southern California is at the Kern River Preserve, an area that also approximately defines the northern boundary of its range within California. Other important populations occur in San Diego County within the riparian habitat along the Santa Margarita and San Luis Rey rivers. Intermittent sightings have occurred within recent years at the south end of Lake Cuyamaca, at the upper end of the Sweetwater Reservoir, at the east end of Lower Otay Lake, and in the Tijuana River Valley (Unitt, 1987). This species breeds within thickets of willows or other riparian understory, usually along streams, ponds or lakes, or in canyon or drainage bottoms. Migrant willow flycatchers may be located among any of the larger trees or shrubs in the County of San Diego, but even migrants seem to prefer riparian areas. Six singing flycatcher males were observed

within the Santa Margarita watershed during 1994 field surveys (Tetra Tech, Inc., 1996a), while data for the 1995 breeding season indicate 10 pairs of flycatchers within the riparian habitat along the Santa Margarita River. Less than half of these paired flycatchers were observed within the project limits, most were seen either downstream or upstream (Tetra Tech, Inc., 1996a). According to 1996 data, four pairs of flycatchers were present within the general project area, all adjacent to Vandegrift Boulevard west of Marine Corps Air Station (MCAS) Camp Pendleton. In addition, eight undetermined breeding status and one transient flycatcher were identified (Dave Boyer, Environmental Security Marine Corps Base Camp Pendleton, 1997).

Arroyo Southwestern Toad
Sensitivity Status: FE, CSC

The arroyo southwestern toad (toad) is known to occur in several localities throughout the river habitat of the Santa Margarita River. Toads typically breed in shallow low-flow pools adjacent to terraces with sandy substrate. Toads have been observed up to 1,500 feet from streams, and 600 feet higher in elevation than the nearest riparian area outside of the breeding season. Activities that may affect arroyo toads are not necessarily limited to the riparian fringe, but may occur well outside this habitat type, during certain periods of their life cycle. Adult toads have been observed in oak woodland, coastal sage scrub, and grassland habitats. Population numbers are difficult to estimate due to the natural history of the toad. For example, a large egg mass may potentially become 20 to 100 individual toads. The Santa Margarita River supports a large population of toads, and they may potentially occur and breed in low flow pools, as well as burrow up to one kilometer away from the river. Data from surveys conducted in the spring of 1995 and 1996 indicate that toads have been observed on several major roads aboard Marine Corps Base Camp Pendleton. To date, records indicate that the species can occur in the Santa Margarita River from the eastern boundary of the base to the Stuart Mesa Road Bridge (personal communication, Environmental Security Marine Corps Base Camp Pendleton, 1997). Within the project area, toads have been observed near the Basilone Road Bridge and near Rifle Range Road. However, they are expected to occur throughout this stretch of the river.

Coastal California Gnatcatcher
Sensitivity Status: FT

The coastal California gnatcatcher (gnatcatcher) population within southern California is currently estimated at approximately 2,000 pairs or less (Atwood, 1992). This species is probably extirpated from San Bernardino County and is continuing to decline in Los Angeles, Orange, Riverside, and San Diego counties due to the continued loss of coastal sage scrub habitats. However, in 1995 and 1996, breeding gnatcatchers were documented in Ventura County and eastern Los Angeles County. In 1991, there were 30 gnatcatcher localities recorded in the coastal sage scrub habitat adjacent to

the Santa Margarita floodplain. In 1996, gnatcatchers were recorded in coastal sage scrub habitat along the bluffs northeast of the northern end of Basilone Road Bridge.

Listed Species Evaluated for Potential to Occur

The following paragraphs discuss two small mammal species which do not occur in riparian or dense vegetation, and are not expected to occur within the Santa Margarita River floodplain in the general area of the project. The evaluation of potential occurrence of these two species focuses on the uplands associated with one of the borrow sites to be used under one of the alternatives, and the Basilone Road Bridge area. Based on the evaluation of each presented below, these two species will no longer be considered in this document.

Pacific Pocket Mouse
Sensitivity Status: FE

Two populations of the Pacific pocket mouse (PPM) occur aboard MCB Camp Pendleton. PPM appear to be restricted to fine-grained, sandy substrates within about three miles of the coast. PPM have been found to inhabit annual weedlands, disturbed and sparsely vegetated grasslands, and open zones within coastal sage scrub vegetation growing on marine terraces where suitable sandy soils exist. PPM have not been captured during live-trapping efforts conducted near the Chappo (22) Area by the USFWS during 1994 (referred to as Ysidora Basin in USFWS, 1994), nor during limited small mammal live-trapping efforts conducted closer to the coast than this project area within the 100-year floodplain of the Santa Margarita River (personal communication, Dave Boyer, Environmental Security, Marine Corps Base Camp Pendleton, 1997). The project area, including the borrow sites, is too far removed from the coast to support this taxon. Nearest known PPM occurrences are located about 1.5 miles toward the coast from the nearest project component (East Oscar borrow site).

Stephens' Kangaroo Rat
Sensitivity Status: FE, CT

Several populations of the Stephens' kangaroo rat (SKR) occur aboard MCB Camp Pendleton. SKR typically occur in disturbed grasslands (characterized by a relatively sparse cover of both shrubs and herbaceous vegetation) on loamy substrates (Tetra Tech, Inc. and SJM Biological Consultants, 1996b). SKR do not occur in riparian vegetation, or dense vegetation. Results of recent surveys have indicated that SKR do not inhabit areas of dense vegetation, even when these areas

were known to have supported SKR shortly after disturbance events (which created openings and allowed colonization). The project area does not support this taxon. Nearest known SKR occupied habitat is located about 1.5 miles north of the nearest project component (Basilone Road Bridge).

Listed Species not Expected to Occur Within Project Area, But Known to Occur On Base

Brown Pelican
Sensitivity Status: FE, CE

The brown pelican was in danger of extinction on the west coast in the 1970s, due to habitat loss and eggshell thinning caused by the use of DDT. This bird is now making a strong recovery on the west coast. It is a year-round resident along the west coast of the U.S. and Baja California, found in open salt water, bays and beaches. The brown pelican is a very common year-round non-breeding visitor to the coastal areas of San Diego County. It very rarely migrates inland during the summer. It, like the white pelican, is colonial in both nesting and feeding; nesting colonies occur offshore. More than 100+ individuals were recorded within Camp Pendleton in 1982, congregating on sandbars within the Santa Margarita River mouth (United States Fish and Wildlife Service, 1982). The brown pelican was observed along the coast line and in the mouth of the Santa Margarita River during the spring of 1995, outside of the proposed project area.

California Least Tern
Sensitivity Status: FE, CE

The California least tern was federally listed as an endangered species by the USFWS in October 1970. The California least tern arrives in southern California in mid-April and leaves in September. Its nesting habitat has been drastically reduced as a result of regional urbanization. In 1915, Sechrist reported observing at least 1,000 nesting pairs of least terns along a three-mile section of coastline in San Diego County from Pacific Beach to Mission Bay. On MCB Camp Pendleton, the tern nesting sites are located on the beaches at the mouth of the Santa Margarita River and on the salt flats of the Santa Margarita Estuary. The California least terns prefer coastal dunes and salt flats for nesting. From 1983 to 1994, the number of nesting attempts in the Santa Margarita River Estuary area increased from 247 to 493 (Marine Corps Base Camp Pendleton, 1994) . The 1995 breeding season was unusually low in the number of successful nests. A total of 363 pairs of least terns, with a total of 420 nesting attempts were made in the Santa Margarita River Estuary during 1995. This is a significant decrease in nesting attempts compared to the 1994 breeding season. Successful nesting for the California least tern in the 1996 season has doubled since 1995 (Tetra Tech, Inc., 1996d). California least terns do not nest within the project limits; however, terns have been observed occasionally foraging in or flying over the Santa Margarita River within the project area.

Western Snowy Plover

Sensitivity Status: FE

The western snowy plover was federally listed as a threatened species by the USFWS in March 1993. The coastal population of western snowy plover consists of both resident and migratory birds. In 1994, the estimated breeding population of western snowy plover aboard MCB Camp Pendleton was 110 individuals, with nesting documented at Blue Beach, Santa Margarita salt flats, and White Beach. Preferred nesting sites are on sand spits, dune-backed beaches, unvegetated beach strands, open areas around estuaries, and beaches at river mouths. Western snowy plover are not expected to occur within the project area.

Belding's Savannah Sparrow

Sensitivity Status: FSC, CE

Belding's savannah sparrows are restricted to salt marsh habitats dominated by pickleweed around coastal lagoons. In the late 1970s and early 1980s concerns began to mount that this species was experiencing a non-cyclic decline. USFWS found 348 pairs of Belding's savannah sparrows in 1984 at the mouth of the Santa Margarita River; however, only 120 were noted in 1991. Habitat loss (especially in the coastal salt marshes and tidal flats) is the leading factor in their decline, since it has reduced important breeding and foraging areas (Marine Corps Base Camp Pendleton, 1994). Several of these birds were noted foraging in the pickleweed near the mouth of the Santa Margarita River during the spring 1995 surveys. None was observed or is expected to occur within the project limits.

Tidewater Goby

Sensitivity Status: FE, CSC

The tidewater goby was federally listed as an endangered species by the USFWS in February 1994. Tidewater gobies occur in the coastal brackish-water habitats in the lower reaches of coastal rivers, streams, and lagoons. Prior to the flooding in 1993, tidewater gobies were known to occur in the lagoons at San Onofre Creek, Las Flores Creek, Santa Margarita River, and Cockleburr Creek. After the flooding, gobies were recorded during surveys of San Mateo Lagoon, but absent from the Santa Margarita River and San Onofre Lagoon (Swift, et al., 1994). The tidewater goby is not expected to occur in the Santa Margarita River near the project area, and may no longer be present in the river.

Federal Species of Concern Known to Occur

There are several federal species of concern known to occur within the project area or with a high probability of occurring. Those observed or most likely to be present are discussed below. In addition, there are several bat species of concern known to occur aboard MCB Camp Pendleton. Certain bat species often roost under bridges, including one federal species of concern. This bat is discussed below.

Western Spadefoot Toad

Sensitivity Status: FSC, CSC

The western spadefoot toad occurs in western California south of San Francisco Bay to northwest Baja California. The western spadefoot toad typically occurs on sandy or gravelly substrate in washes and floodplains with relatively open vegetation. Western spadefoot toads were observed within the 100-year floodplain of the Santa Margarita River during the 1995 surveys.

Southwestern Pond Turtle

Sensitivity Status: FSC, CSC

The southwestern pond turtle typically occurs in ponds, small lakes, reservoirs, and slow-moving streams. Emergent freshwater vegetation is frequently present in occupied habitat, as are basking logs or muddy banks. This species is known to occur in the Santa Margarita River (Ysadora Basin and opposite 25 Area Sewage Treatment Plant) on MCB Camp Pendleton.

San Diego Horned Lizard

Sensitivity Status: FSC, CSC

The San Diego horned lizard is typically associated with open coastal sage scrub, especially areas of level to gently sloping ground with well-drained, loose or sandy soils. This species is known to occur on MCB Camp Pendleton.

Orange-throated Whiptail

Sensitivity Status: FSC

The orange-throated whiptail is typically associated with open coastal sage scrub. This species is known to occur on MCB Camp Pendleton.

Coastal Western Whiptail

Sensitivity Status: FSC

The coastal western whiptail typically occurs in open areas in otherwise moderately dense coastal sage scrub and chaparral vegetation. This species is known to occur on MCB Camp Pendleton.

Silvery Legless Lizard

Sensitivity Status: FSC, CSC

The silvery legless lizard typically occurs in loose soil in coastal sage scrub, chaparral, grasslands, and open riparian vegetation. The sand of washes is often used by this fossorial, nocturnal animal. This species is known to occur on MCB Camp Pendleton.

Coast Patch-nosed Snake

Sensitivity Status: FSC, CSC

The coast patch-nosed snake typically occurs in coastal sage scrub, chaparral, grasslands, and sandy or rocky areas of slopes. This species is known to occur on MCB Camp Pendleton.

Two-striped Garter Snake

Sensitivity Status: FSC

The two-striped garter snake occurs along permanent or nearly permanent fresh water streams or in ponds from the coast to the higher mountains and the desert foothills (Stebbins, 1985). Once considered the most common snake in San Diego County, it is now extirpated from many areas. Results from 1995 and 1996 aquatic surveys have located two-striped garter snakes at numerous sites aboard MCB Camp Pendleton, including the Santa Margarita River drainage in the 22 Area.

Red Diamond Rattlesnake
Sensitivity Status: FSC

The red diamond rattlesnake is generally associated with coastal sage scrub and chaparral vegetation, often with rocky areas. This species is known to occur on MCB Camp Pendleton.

Southern California Rufous-crowned Sparrow
Sensitivity Status: FSC

The southern California rufous-crowned sparrow is a sedentary resident species inhabiting rocky slopes with relatively open coastal sage scrub cover, often intermixed with grassy areas. The majority of this sparrow's range occurs west of the deserts, and from Ventura County south into Baja California. Population declines have been attributed to habitat loss. A few rufous-crowned sparrows were observed during the 1995 spring survey in the grassy disturbed area near Rifle Range Road.

Bell's Sage Sparrow
Sensitivity Status: FSC

This dark coastal subspecies occurs along the coast from Trinity County south into Baja California. It is a resident in areas of fairly dense chaparral, as well as mixed chaparral and coastal sage scrub associations. During the spring 1995 surveys, Bell's sage sparrows were observed in the chaparral adjacent to the Santa Margarita River floodplain.

White-tailed Kite
Sensitivity Status: CFP

Although not a federal species of concern, white-tailed kites are fully protected by the State of California and are considered uncommon. They nest in riparian woodland, live oaks, or groves of western sycamores bordering grassland or open fields. Kites forage in any open, grassy area, and often hover over the weedy margins of freeways. The breeding range covers most of the coastal lowland, but its eastward and upward altitudinal limits are not well known. During the surveys, white-tailed kites were observed foraging in the grassland and coastal sage scrub habitat adjacent to the Santa Margarita floodplain.

Yuma Myotis
Sensitivity Status: FSC

The Yuma myotis is a small bat which typically roosts and forages in the vicinity of water. It often roosts under bridges, and in buildings, tunnels, and caves. This species is known to forage over the Santa Margarita River, and to roost under bridges within about six miles of Basilone Road Bridge (personal communication, Dr. Pat Brown, 1997). The Basilone Road Bridge was not surveyed for bats during recent intensive base-wide bat surveys, because it was considered to be too low to represent a high quality roost site. However, the Yuma myotis could potentially roost under this bridge (as could also the Brazilian free-tailed bat and big brown bat).

San Diego Black-tailed Jackrabbit
Sensitivity Status: FSC, CSC

The San Diego black-tailed jackrabbit occurs in open grassland and areas of sparse shrublands. This species may be present in the project area.

San Diego Pocket Mouse
Sensitivity Status: FSC, CSC

The San Diego pocket mouse typically occurs in relatively open coastal sage scrub vegetation. This species is known to occur within the Santa Margarita River Floodplain.

San Diego Desert Woodrat
Sensitivity Status: FSC, CSC

The San Diego desert woodrat tends to occupy dry, rocky areas in coastal sage scrub and chaparral vegetation. They can also occur in riparian vegetation. This species is known to occur on MCB Camp Pendleton.

Federal Species of Concern not Expected to Occur Within Project Area, But Known On Base

Elegant Tern
Sensitivity Status: FSC

The elegant tern is an abundant summer resident in the single San Diego County nesting colony at the south end of San Diego Bay. They never venture farther inland than the upper ends of the coastal lagoons. They commonly rest in flocks on mudflats, sandbars, or beach dunes, and forage in the bays or oceans. The range of the elegant tern is expanding northward which may be related to the destruction of several nesting colonies in Baja California. They were observed feeding near the mouth of the Santa Margarita River during the 1995 spring survey. They may rarely forage in or fly within the project limits.

Long-billed Curlew
Sensitivity Status: FSC

The long-billed curlew breeds in southwestern Canada and the western U.S., and winters south through Mexico to Honduras and Costa Rica. Growing concern began in the early 1980s, with its listing on Audubon's Blue List, and placement on local concern lists . Decline is likely due to habitat loss and degradation, but may also be attributable to organochlorine poisoning. In California, it is most common in the Imperial and Central valleys, where there are abundant agricultural fields and grasslands. In San Diego County, they prefer the tidal marshes and mudflats found at the mouth of the Tijuana River, San Diego Bay, Mission Bay, and the mouth of the San Diego River. The long-billed curlew was an occasional, but conspicuous spring visitor in 1982 at the Santa Margarita River mouth with a few sightings up along the lowermost river. The species peak abundance is expected in winter (United States Fish and Wildlife Service, 1982). Two individuals were observed feeding in the mudflats near the mouth of the Santa Margarita River during the spring 1995 survey. None was observed or are expected to occur within the project limits.

3.3.4 Ecological Characteristics of the Santa Margarita River

The Santa Margarita River supports one of the largest remaining contiguous riparian corridors in southern California. Riparian habitats, particularly in arid environments such as San Diego County, represent highly productive communities for both plants and wildlife. The presence of some degree of soil moisture allows the development of large and dense scrub and woodland plant communities. These plant communities often support a highly abundant and varied fauna. The key attributes of

riparian vegetation for wildlife are high plant productivity, structural diversity, function as a linear movement corridor, and creation of ecotones and edges with upland and riverine habitat types.

The vegetation along the Santa Margarita River supports various riparian-obligate breeding birds (including sensitive species), as well as migrants and overwintering species. The large trees associated with riparian woodlands also provide roosts for resident and migrant raptors. This habitat provides excellent shelter and food sources for various mammals that typically occur in adjacent uplands, as well as riparian-associated mammals. Riparian woodlands along the river provide high quality wildlife habitat due primarily to structural diversity. This diversity includes a dense canopy layer, a middle shrubby layer, and a complex understory. Each of these structural elements may provide habitat for a unique faunal assemblage. Riparian scrub provides high quality wildlife habitat for similar reasons, although it is not as structurally diverse as woodlands. Riparian scrub along the Santa Margarita River is used extensively by birds, especially resident and neo-tropical migrant passerine species. In addition, the open water and gravel areas of the river are used by aquatic species including fish, amphibians and certain reptiles.

From the perspective of regional wildlife movement and connections, the Santa Margarita River occupies an important location. As mentioned, the river is an important riparian corridor which connects the coastal area with the inland portions of its upper watershed. While much of the area adjacent to the river is not highly developed, the riparian vegetation along the river provides an area of continuous cover. This cover is important for transiting small-, medium-, and large-sized mammals, and it provides a contiguous strip of habitat (with a large amount of 'edge habitat' inherent in linear corridors) for transiting birds.

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3.4 LAND USE

3.4.1 Definition of Resource

Land use can be separated into two major categories: undeveloped and developed. Undeveloped land uses include open, or undisturbed areas. Developed land use classifications include residential, commercial, industrial, communications and utilities, agricultural, institutional, recreational, and other human-modified areas. Land use is regulated by management plans, policies, regulations, and ordinances that determine the type and extent of land use allowable in specific areas and protect specially designated or environmentally sensitive areas.

Master Plans. Land use on MCB Camp Pendleton and MCAS Camp Pendleton is planned and documented in the master plan for these installations. The purpose of the master plans is to construct a framework to guide future growth. The recommendations in the master plans ensure proper siting of programmed construction projects. The recommendations help to optimize the use of U.S. Marine Corps (USMC) resources and allow increases in operational capabilities. One of the primary land use issues addressed in the master plans is the protection of airspace for aircraft operations. Aircraft operations (departure, arrival, touch-and-go, field carrier landing practices, ground control approach) are conducted at the MCAS Camp Pendleton airfield and in special use airspace (military operations areas and restricted areas). Preservation of unobstructed runway approach and departure paths and other navigable airspace near airfields is an important factor when discussing land use compatibility.

Air Installation Compatible Use Zone Program. The Air Installation Compatible Use Zones (AICUZ) program establishes guidelines and provides recommendations for land use planning and policies that affect military installations and surrounding communities. Land use compatibilities are based on a combination of two factors: noise and aircraft safety. The Department of Defense (DoD) and USMC require that an AICUZ program which addresses noise levels (Section 3.6) and accident potential zones (Section 3.10) be created for each base (Department of Defense Instruction 4165.57 and Naval Operations Instruction 11010.364). An overlap of the noise and safety environment forms the basis of land use compatibility guidelines contained in the AICUZ.

Navy Facilities Engineering Command (NAVFAC) standards identify the following types of airfield safety criteria, which are used as guidance for identifying obstructions to air navigation:

- Height Restrictions - Restrictions in the form of specific height limits or imaginary surfaces through which structures and objects shall not penetrate. An imaginary surface is the slope or angle at which an aircraft departs or arrives from an airfield. Federal Aviation Regulations specify a series of imaginary height restriction surfaces surrounding an airport to prevent conflicts with aircraft approach and departure paths. These surfaces

consist of imaginary planes with specific starting and ending points on a particular slope and include the primary surface, the approach-departure clearance surface, and the clear zones.

Any terrain or man-made objects that extend above the imaginary surface are considered an obstruction. A penetration of the imaginary surface is not advised, and all new development is recommended to stay beneath these surfaces if physically and economically possible. If any objects, man-made or natural, penetrate these surfaces, a waiver must be obtained from Naval Facilities Engineering Command (NAVAIR). These restrictions and regulations are considered during construction activities and planning of military air installations. It is a goal of airfield planning to eliminate items which require waivers whenever possible. No facility has been planned on MCAS Camp Pendleton that would require a waiver unless that facility contributes to a higher level of safety (such as a radar site) or the risks involved are negligible.

There are several man-made and terrain obstructions already present that extend into the imaginary surfaces of the MCAS airfield for which airfield waivers have been obtained. MCAS Camp Pendleton has waivers for the following facilities: Precision Approach Radar, Endangered Species Habitat in a Clear Zone (temporary), Automatic Weather Station, Excess Runway Shoulder (in the removal process), and Tactical Radar Training Site (requested).

- Lateral Clearances - Standards as to how close objects may be sited to airfield pavements regardless of their height, including separation between airfield pavements.

The AICUZ identifies the following airfield safety clearances:

- Clear Zones - Areas immediately adjacent to runway thresholds which provide space for unobstructed take-offs and landings, and to serve as emergency overrun areas. These are designated as Type I and III Clear Zones as well as Accidental Potential Zones (APZs) I and II.

  The clear zone, the closest area to the end of the runway, is the most hazardous of the three zones. The overall risk is considered so high that the land usually is acquired in fee simple or as an easement.

- APZ I - APZ I is located adjacent to the clear zone and possesses a significant potential for accidents. All types of residential use are considered incompatible.

However, some types of low-density industrial, commercial, institutional, and recreation uses are compatible.

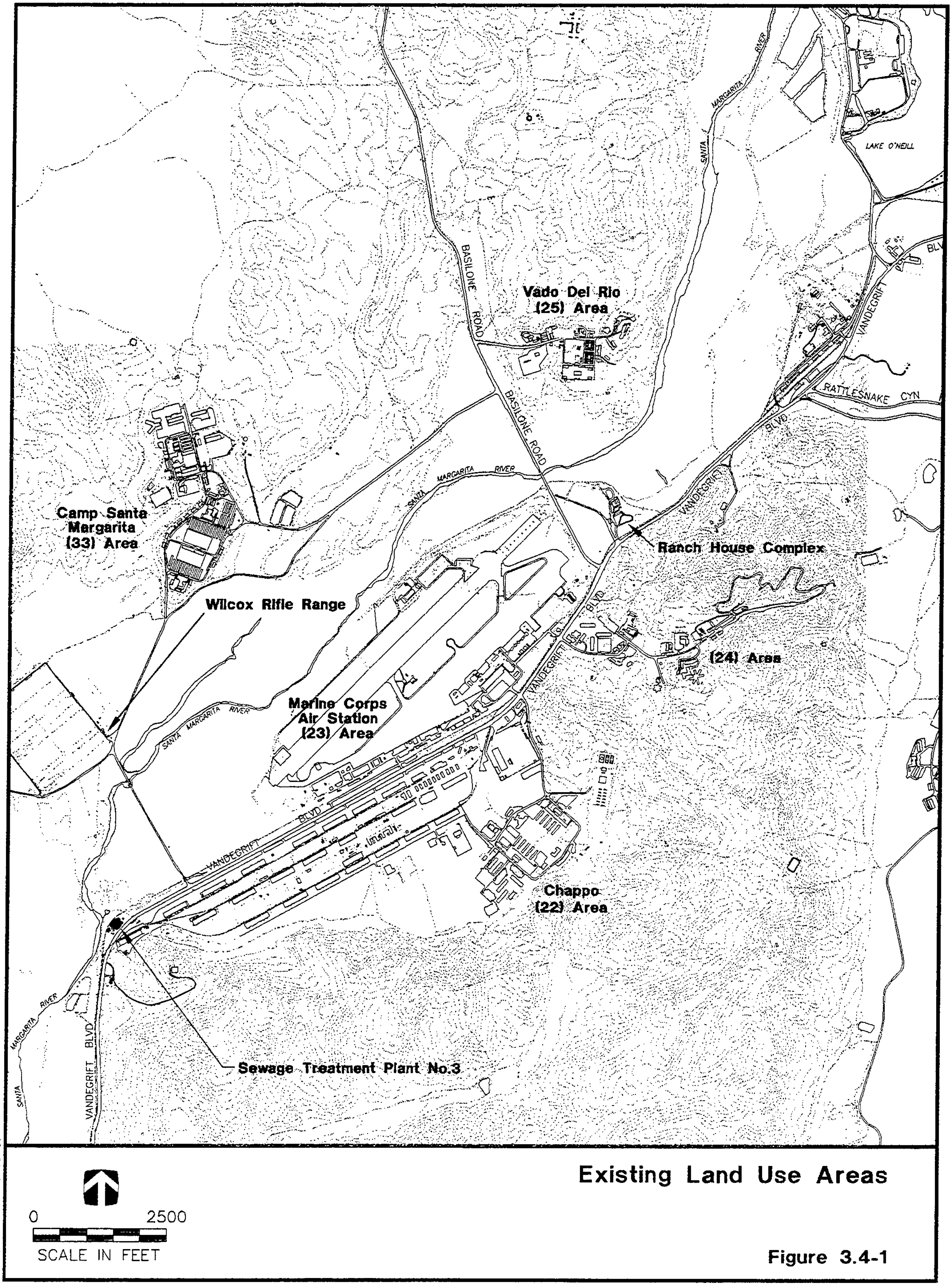
- APZ II - APZ II has a lower potential for accidents than APZ I. However, APZ II still has a significant risk factor. Residential uses are considered compatible only at low densities. All agricultural uses, mining, most industrial uses, low density commercial, recreational, and some institutional uses are also considered compatible uses within APZ II. Public and private uses that concentrate people in small areas, such as schools, hospitals, and churches, are considered incompatible uses.

3.4.2 Existing Land Uses

Existing land uses at MCB Camp Pendleton are characterized by developed areas separated by large areas of relatively undeveloped land. Developed land is divided into three distinct areas: operations, housing, and administration. Further breakdown of the land uses at MCB Camp Pendleton include areas designated for training, maintenance, public works, supply/fuels, ordnance, medical, personnel support, agricultural outlease, easement areas, natural areas, and outdoor recreation. Some of the largest developed areas are in the southeastern portion of the base, and includes the Headquarters Area, MCAS Camp Pendleton, and the U.S. Naval Hospital. These developed areas are separated by large areas of relatively undeveloped land used for training and maneuvers. Maneuvers are prohibited in the developed areas. Maneuvers are also prohibited in certain areas because of hazardous operations (e.g., unexploded ordnance disposal) or critical environmental factors (e.g., sensitive habitat).

Although the proposed project area is located in undeveloped areas in the southeast portion of the base, there are several developed areas that are adjacent to the proposed project area or nearby (Figure 3.4-1). These areas include the following:

MCAS Camp Pendleton (23 Area). MCAS Camp Pendleton is located in the southern part of MCB Camp Pendleton directly south of the Santa Margarita River and north of Vandegrift Boulevard and the Chappo (22) Area. Major facilities consist of the airfield, including runway, taxiways, aircraft parking aprons, and other airfield support facilities; aircraft maintenance hangars and smaller maintenance facilities; ordnance handling, and storage; a simulator facility and several training buildings; general warehousing and fuel storage and dispensing facilities; and administrative buildings. The airfield portion of MCAS Camp Pendleton has only a limited number



Existing Land Use Areas

Figure 3.4-1

of structures because of airfield operational safety clearances and restrictions. Most of the maintenance and other support facilities are east of the airfield adjacent to Vandegrift Boulevard.

Chappo (22) Area. The Chappo (22) Area is located within the Santa Margarita River floodplain south of MCAS Camp Pendleton and Vandegrift Boulevard. The southern portion of the Chappo (22) Area contains a natural flood basin. The Chappo (22) Area is the location of the consolidated supply and storage warehouse complex on MCB Camp Pendleton. The western half of this area primarily consists of large warehouse buildings with some administrative and maintenance facilities. The eastern half of the Chappo (22) Area includes housing and personnel support (including barracks and a mess hall), and recreation facilities. STP No. 3 is adjacent to the western boundary of the Chappo (22) Area and north of Vandegrift Boulevard. The MCB Camp Pendleton Master Plan designates the Chappo (22) Area as a Troop Area.

Chappo (24) Area. The Chappo (24) Area is south of the intersection of Vandegrift Boulevard and Basilone Road and east of MCAS Camp Pendleton. This area consists of consolidated areas of operations and training facilities, billeting, personnel support, and administration, primarily for MCAS Camp Pendleton personnel. The western portion of this area includes barracks and a dining hall. Maintenance, supply, and storage facilities and the MCB Camp Pendleton correctional facility are located in the eastern portion of this area. Two stormwater drainage systems carry runoff from the Chappo (24) Area. The MCB Camp Pendleton Master Plan designates the Chappo (24) Area as a Troop Area.

Vado Del Rio (25) Area. The Vado Del Rio (25) Area is located on a knoll north of the Santa Margarita River and east of Basilone Road. This area consists of vehicle and equipment maintenance areas that primarily support MCAS Camp Pendleton. Historically, this area included Quonset huts which were used for administrative offices and storage, but have since been removed. A kennel area and a skeet range are also located in this area. The MCB Camp Pendleton Master Plan designates the Vado Del Rio (25) Area as a Troop Area.

Margarita (33) Area. The Margarita (33) Area is located on the north side of the Santa Margarita River and north of MCAS Camp Pendleton; road access is provided by Las Flores Road, which connects with Basilone Road. The area consists of three central structures, each with a centralized billeting area surrounded by supporting facilities for administrations, storage and dining areas, separated by common recreation areas. The MCB Camp Pendleton Master Plan designates the Margarita (33) Area as a Troop Area.

Santa Margarita River. On MCB Camp Pendleton the Santa Margarita River is a multiple use area which includes a maneuver access corridor and a highly-regulated natural resources area. The Master Plan also identifies several areas, including the Santa Margarita River, as floodplains. As such, these areas impose significant development and use constraints in accordance with Executive Order 11988, which restricts and defines Federal actions that may take place in a floodplain. These regulations were designed to reduce the risk of flood, and minimize the impact of floods on human safety, health, welfare, and property.

Santa Margarita Ranch House Complex. The Santa Margarita Ranch House complex is located northeast of MCAS Camp Pendleton at the intersection of Basilone Road and Vandegrift Boulevard. The Santa Margarita Ranch House is the official residence of MCB Camp Pendleton Commanding General and was listed on the National Register of Historic Places in 1971. The Santa Margarita Ranch House complex consists of approximately 21 acres on which the ranch house adobe residence, a chapel, and associated structures are located. The MCB Camp Pendleton Master Plan identifies the Santa Margarita Ranch House complex as being within a designated maneuver area. More information on the Santa Margarita Ranch House is provided in Section 3.8, Cultural Resources.

Wilcox Live-Fire Ranges. Two live-fire ranges, identified as the Wilcox Live-Fire Ranges (Ranges 102 and 103) are located southwest of the Margarita (33) Area and north of the Santa Margarita River. The Wilcox Live-Fire Ranges are identified in the MCB Camp Pendleton Master Plan as live-fire ranges with adjacent maneuver areas, which are used as combat training areas for weapons, specifically rifles, pistols, and shotguns. Access to the Wilcox Live-Fire Ranges is provided by Stagecoach Road from the Margarita (33) Area and Rifle Range Road from Vandegrift Boulevard.

3.4.3 Construction Project Sites

Levee. An existing temporary levee is located along the east portion of the proposed levee alignment which provides limited flooding protection to the Santa Margarita Ranch House complex and the east end of MCAS Camp Pendleton. All three levee alignments would replace the existing temporary levee, and follow approximately the same alignment extending west to protect the entire length of MCAS Camp Pendleton. All levee alternatives would be constructed in the Santa Margarita River channel, which is a multiple use area including a maneuver access corridor and a highly-regulated natural resource area. The proposed location of all levee alternatives would be

within a Type II Clear Zone and below an approach/departure clearance surface and a transitional surface.

Stormwater Management System. The proposed stormwater management system would be located on undeveloped land west of MCAS Camp Pendleton. The pump station construction staging site would be located at the west end of the Chappo (22) Area, on existing pavement. This is designated as a maneuver area in the MCB Camp Pendleton Master Plan. A floodwater detention area for Levee Alignments 1 and 2 would be located west of the MCAS Camp Pendleton runway in an undeveloped area.

Basilone Road Bridge Replacement. The proposed construction sites for all three bridge replacement alternatives are located in areas designated as a maneuver area in the MCB Camp Pendleton Master Plan. The proposed construction sites for the Existing Alignment (Alternative A) and East Curve Alignment (Alternative B) would be located on or adjoining the existing Basilone Road Bridge and the Santa Margarita Ranch House complex. The Rattlesnake Canyon Road Bridge (Alternative C) would connect with Vandegrift Road near the Chappo (24) Area and extend through the Santa Margarita River channel to the Vado Del Rio (25) Area to connect ultimately with Basilone Road. The proposed location of the Basilone Road Bridge replacement would be within a Type II Clear Zone.

There are two proposed borrow sites which will be used for the entire project construction. The Chappo (22) Area proposed borrow site is located adjacent to the east boundary of Chappo (22) Area. The East Oscar proposed borrow site is located west of the Wilcox Live-Fire Ranges. Both of these proposed borrow sites are within areas designated as a maneuver areas.

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3.5 TRAFFIC

3.5.1 Definition of Resource

The affected environment for the traffic analysis includes all roadway segments that may be involved in the construction and operation of the proposed project. This includes the network of interstate and state highways, county and local roads, and principal roads on the base that would serve as access to the project areas for construction materials and workers, as well as base personnel during the life of the project. A description of the affected roadways, along with existing and projected baseline conditions against which potential traffic impacts from the project will be assessed, is provided.

3.5.2 Existing Conditions

Evaluation of existing roadway conditions focuses on capacity, which reflects the ability of the network to serve traffic demand and volume. The capacity of a roadway depends on width, the number of lanes, intersection control, and other factors. Traffic volumes are typically reported, depending on the nature of the data available, as the daily number of vehicles traveling in both directions on a segment of roadway (average daily traffic [ADT]) and/or the number of vehicular movements on a given road segment during the average peak hour. Traffic volumes provide existing travel quantities and patterns and provide a baseline to forecast future quantities and patterns. Traffic volumes, in addition to vehicular flow, roadway, and traffic control parameters, are the primary factors used to determine capacity and level of service (LOS) designations.

The performance criteria of a roadway segment is generally expressed in terms of LOS. The LOS scale ranges from A to F, with each level defined by a range of volume-to-capacity ratios. LOS A represents free flow. LOS F represents forced or breakdown flow. It is characterized by stop and go waves and traffic is extremely unstable. The amount of traffic approaching a point exceeds the capacity of operation. LOS designations and their associated volume-to-capacity ratios are presented in Table 3.5-1. These levels of service criteria are based primarily on estimates from the *Highway Capacity Manual Special Report 209* (Transportation Research Board, 1995), and are adapted for local conditions.

Based on the description of the Proposed Action and Alternatives in Section 2.0, the key roadway segments that may be affected include Vandegrift Boulevard from the Oceanside Gate to Stuart Mesa/Ash Road; Vandegrift Boulevard from Stuart Mesa/Ash Road to 9th Street (Chappo Area); Vandegrift Boulevard from 9th Street to Basilone Road; Vandegrift Boulevard from Basilone Road to Rattlesnake Canyon Road; Rattlesnake Canyon Road; Basilone Road from Vado Del Rio Road

Table 3.5-1

Roadway Levels of Service Criteria

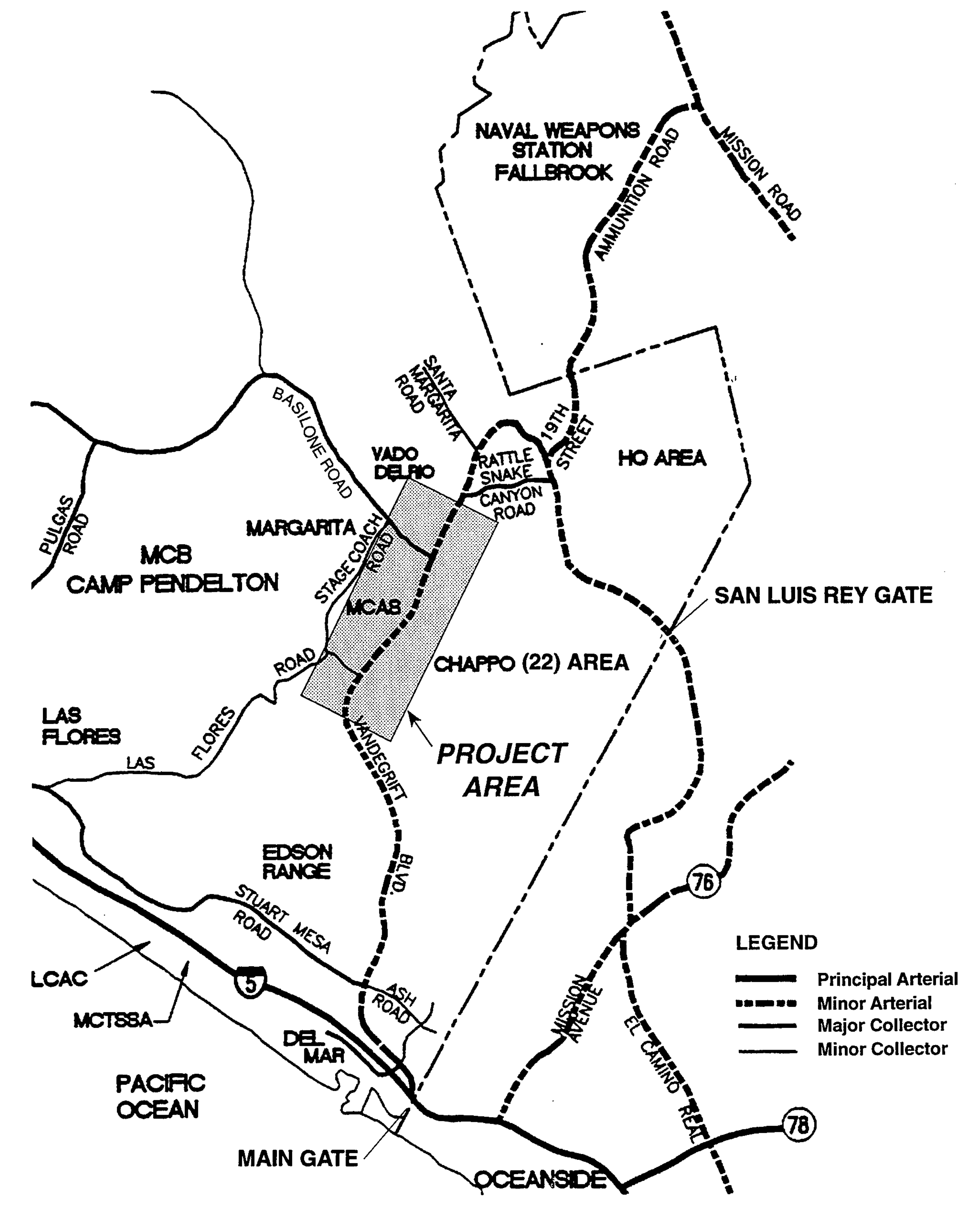
LOS	Description	Criteria (Volume-to-Capacity Ratio) Freeway[1]	Multi-Lane Highway[2]	2-Lane Highway[3]
A	Free flow with users unaffected by presence of other users of roadway.	0-0.30	0-0.30	0-0.12
B	Stable flow, but presence of users in traffic stream becomes noticeable.	0.31-0.49	0.31-0.50	0.13-0.24
C	Stable flow, but operation of single users becomes affected by interactions with others in traffic stream.	0.50-0.72	0.51-0.70	0.25-0.39
D	High density but stable flow; speed and freedom of movement are severely restricted; poor level of comfort and convenience.	0.73-0.88	0.71-0.84	0.40-0.62
E	Unstable flow; operating conditions at capacity with reduced speeds, maneuvering difficulty, and extremely poor levels of comfort and convenience.	0.89-1.00	0.85-1.00	0.63-1.00
F	Forced or breakdown flow with traffic demand exceeding capacity; unstable stop-and-go traffic.	>1.00	>1.00	>1.00

Notes: [1]From Table 3-1, LOS for basic freeway sections 6 lanes or more, 70 miles per hour.
[2]From Table 7-1, LOS, 50 miles per hour design speed, multi-lane highway. Applicable to four-lane arterial.
[3]From Table 8-1, level terrain, 20 percent no passing zones, design speed 60 miles per hour or greater. Applicable to two-lane streets.

Source: Transportation Research Board, Highway Capacity Manual, Special Report 209, 1995.

(Area 25 Access Road) to Vandegrift Boulevard; Vado Del Rio Road; and Stagecoach Road. The key roadways in the project area are described below. Figure 3.5-1 shows key roadway segments within the project area.

Vandegrift Boulevard is a four- to six-lane minor arterial roadway extending from the Oceanside Gate to the San Luis Rey Gate. This roadway serves as the main road through the Chappo Area, MCAS, and Headquarters areas. Vandegrift Boulevard is the primary access road to Del Mar and to the Wire Mountain housing areas via Wire Mountain Road; to the Stuart Mesa housing areas via Stuart Mesa Road; and to the Margarita, Vado Del Rio, and Pulgas areas, and western portions of



Source: MCB Camp Pendleton, Traffic Engineering Study, August 1995.

MCB Camp Pendleton Circulation Map

No Scale

Figure 3.5-1

MCB Pendleton via Basilone Road. An ADT of 22,200 vehicles was recorded for Vandegrift Boulevard south of the Chappo Area and 28,850 vehicles south of the Oceanside Gate (Daniel Consultants, 1995). The speed limit on Vandegrift Boulevard ranges from 30 to 55 miles per hour (mph).

Basilone Road is a two- to three-lane major collector roadway extending generally east and west, and connecting I-5 at the San Onofre Gate with Vandegrift Boulevard. This roadway provides access across the Santa Margarita River by way of a temporary bridge erected to replace the permanent structure that was destroyed during major flooding in 1993. It serves as the main east-west route traversing MCB Camp Pendleton and connects Vado Del Rio (via Vado Del Rio Road), Margarita (via Stagecoach Road), Pulgas, Horno, San Onofre, and the San Onofre Exchange. An ADT of 10,550 vehicles was recorded for Basilone Road east of Stagecoach Road (Daniel Consultants, 1995). The speed limit on Basilone Road ranges from 25 to 50 mph in non-cantonment areas and is limited to 25 mph in cantonment areas.

Rattlesnake Canyon Road is a four-lane major collector roadway lying generally east and west. Rattlesnake Canyon Road short cuts the northern portion of Vandegrift Boulevard and provides access to the Headquarters area from Vandegrift Boulevard and the Oceanside Gate.

Peak-hour traffic volumes and LOS on key roads in the project area are summarized in Table 3.5-2. For each road segment, the table shows the one-way peak hour directional capacity and traffic volumes for Vandegrift Boulevard segments and two-way capacity and traffic volumes for all other roadway segments and the corresponding LOS during the average morning and afternoon peak hour. In 1995, the most critical traffic conditions were concentrated on Rattlesnake Canyon Road during both the morning and afternoon peak hour, and on Basilone Road between Area 25 (Vado Del Rio access road) and Vandegrift Boulevard. Basilone Road operated at LOS D, while Rattlesnake Canyon Road operated at LOS E. All other road segments operated at LOS C or better.

Although key segments of Vandegrift Boulevard operate at acceptable levels of service, some intersections experience significant delays during peak-hour traffic. This includes the intersection of Vandegrift Boulevard at Stuart Mesa Road/Ash Road primarily during the afternoon peak hour which experienced significant delays at LOS D, E, or F in all directions (Daniel Consultants, 1995). Minor delays were also experienced at 9th Street and Vandegrift Boulevard in both the eastbound and westbound directions (LOS D) during both the morning and afternoon peak hour. At Basilone Road, minor delays were also experienced at Vandegrift Boulevard, both in the morning and afternoon peak hour. Intersections at Basilone Road with Stagecoach Road and Vado Del Rio Road had minor delays during the morning peak hour because of restricted left turn access onto Basilone Road. Westbound Rattlesnake Canyon Road had minor delays (LOS D) in the afternoon.

Table 3.5-2

Average Peak-Hour Traffic Volumes on Key Roads

Roadway Segment	Capacity (vph)[1,2]	1995				1999			
		Traffic[1,2]		LOS		Traffic[1,2]		LOS	
		AM	PM	AM	PM	AM	PM	AM	PM
Vandegrift Boulevard, Oceanside Gate to Stuart Mesa Road/Ash Road	5,400	1,940	1,550	B	A	2,260	1,770	B	B
Vandegrift Boulevard, Stuart Mesa Road/Ash Road to 9th Street (Chappo Area)	3,600	1,930	1,460	B	A	2,240	1,690	B	B
Vandegrift Boulevard, 9th Street to Basilone Road	3,200	1,250	1,150	B	B	1,450	1,330	B	B
Vandegrift Boulevard, Rattlesnake Canyon Road to Basilone Road[3]	3,200	1,520	1,630	B	B	1,760	1,890	B	B
Basilone Road, Vandegrift Boulevard to Vado Del Rio Road (Area 25)	2,000	860	820	D	D	1,000	950	D	D
Rattlesnake Canyon Road	2,200	1,510	1,360	D	D	1,750	1,580	D	D
Stagecoach Road	2,000	300	300	B	B	350	350	B	B
Vado Del Rio Road (Area 25)	2,000	210	140	A	A	240	160	B	A

Notes: [1]Vandegrift Boulevard capacity and volumes shown as one-way directional for morning and afternoon peak hour traffic flows. All other road segments reflect two-way capacities and volumes.
[2]All traffic figures are rounded to the nearest ten and expressed in vehicles per hour (vph).
[3]The one way directional flow is Rattlesnake Canyon Road to Basilone Road during the morning peak hour, and Basilone Road to Rattlesnake Canyon Road during the afternoon peak hour.

Projected Baseline. Currently, MCB Camp Pendleton has an assigned population of 37,400 military personnel. It is anticipated that by 1999, 43,000 personnel will be assigned to the base, an increase of 16 percent. Approximately 28,600 personnel currently live on the base. By 1999, it is anticipated that approximately 33,100 personnel will reside on MCB Camp Pendleton. Onbase housing is anticipated to increase by 15.8 percent by 1999 and offbase housing is anticipated to increase by 16.7 percent. Overall, the number of base personnel is anticipated to increase 16 percent by 1999. Therefore, a growth factor of 1.16 was applied to all existing traffic volumes.

The level of service for most of the key road segments that may be influenced by the proposed project would remain unchanged through 1999. However, some segments would experience a minor decline in LOS during the morning peak hour. They include Vandegrift Boulevard from Stuart Mesa/Ash Road to 9th Street (LOS C to D). The access road to Area 25 (Vado Del Rio) would have an insignificant decline from LOS A to B. Rattlesnake Canyon Road would decline in level of service during the afternoon peak hour from LOS D to E in 1999.

Delays at critical intersections would continue to deteriorate through 1999. Vandegrift Boulevard at Stuart Mesa Road/Ash Road would experience a drop in levels of service from D and E to LOS F. Basilone Road would also continue to experience a decline in level of service in the morning peak hour because of difficulties with left turn access onto Basilone Road from Stagecoach Road and Vado Del Rio Road. LOS at Basilone Road and 9th Street would remain about the same through 1999.

3.6 NOISE

3.6.1 Definition of Resource

Noise Descriptors. Noise is generally defined as unwanted sound. Sound level is a physical phenomenon consisting of minute vibrations which travel through a medium, such as air, and are sensed by the human ear. Sound levels are usually measured and expressed in decibels (dB). A sound level of 0 dB is approximately the threshold of human hearing but is barely audible. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB are felt inside the human ear as discomfort. A change in sound level of about 10 dB, is usually perceived as doubling of the sound's loudness.

Sensitive Receptors. Sensitive noise receptors are, in general, areas of habitation where the intrusion of noise has the potential to adversely impact the occupancy, use, or enjoyment of the environment. Sensitive receptors include areas such as residences, schools, hospitals, churches, etc. Sensitive receptors may also be non-human receptors such as bird species and rare or threatened species.

Noise Terminology. The normal human ear can detect sounds in a wide range of frequencies. However, all sounds in this wide range of frequencies are not heard equally well by the human ear. In measuring community noise, this frequency dependence is taken into account by adjusting very high and very low frequencies to approximate the human ear's lower sensitivity to those frequencies. This is called A-weighing and sound levels measured on the A-weighted scale are expressed as A-weighted decibels (dBA).

Community Noise Equivalent Level (CNEL) is the weighted average sound level for a 24-hour day. It is calculated by adding 5 dB to noise during the evening (7:00 p.m. to 10:00 p.m.) and 10 dB to noise during the night (10:00 p.m. to 7:00 a.m.). The penalty is assigned to account for the increased sensitivity to noise during the quiet hours of the day. The Day-Night Average Sound Level (L_{dn}) is similar to CNEL, but does not include the 5 dB penalty for evening noise. Noise expressed in L_{dn} is often used interchangeably with CNEL, but is approximately 1 dB less than CNEL. The CNEL is required for analyses of aircraft noise under the California Department of Aeronautics regulations. CNEL is also the common measurement used by state and local jurisdictions for determining land use compatibility.

CNEL and L_{dn} are graphically depicted as noise contours or lines of equal loudness. Contours are tools used by planners for making land use compatibility decisions. Contours can be developed for a variety of noise sources and are most often the method for illustrating vehicular and airport noise levels. Noise contour maps depict the 60, 65, 70, 75 and 80 dB CNEL or L_{dn} associated with a particular noise source. The contours are generated by computer models which rely on aircraft or

vehicle activity forecasts. Title 21 of the California Code of Regulations (CCR), Section 5012, defines a noise impact area as one where noise sensitive land uses have more than a 65 dB annual average CNEL noise exposure. Sound levels over time are expressed as the energy-equivalent continuous noise level (L_{eq}). This scale represents the average sound level at a receptor.

Air Installation Compatible Use Zone Program. Noise contours for military airports are typically presented in the AICUZ study. The Department of Defense (DoD) initiated the AICUZ program to protect the public's health, safety, and welfare, and prevent civilian encroachment from degrading the operational capability of military air installations. Under the AICUZ program, recommendations regarding land uses which are compatible with noise levels, accident potentials, and associated flight clearance requirements related to military airfield operations have been established. Issues related to the latter two items are discussed in Section 3.10. Guidelines for land use compatibility within certain noise contours have been developed under the AICUZ program using a Land Use Compatibility matrix. Residential, hospital, and school land uses are generally considered to be incompatible with noise levels above 65 dB CNEL, whereas administrative, industrial, and warehousing uses are considered to be generally compatible with noise levels up to 85 dB CNEL.

3.6.2 Existing Ambient Noise Levels

Existing noise sources in the project area primarily consist of noise from fixed-wing and helicopter operations at MCAS Camp Pendleton, including flying operations and high-power ground runup operations. Motor vehicle traffic on surrounding roadways, particularly Vandegrift Boulevard and Basilone Road, also contributes to ambient noise levels.

MCAS Camp Pendleton has a 6,000-foot-long and 200-foot-wide hard surface runway (03/21) oriented in a northeast-southwest direction. Runway 21 (to the southwest) is used 90 percent of the time and Runway 3 is used 10 percent of the time. Approximately 11,000 flight operations per month occur, with helicopter operations comprising 86 percent of the total flight operations; fixed-wing (light) operations, comprising 12 percent; and fixed-wing (heavy) operations, comprising 2 percent (MCAS Camp Pendleton Master Plan, 1989). The MCAS Camp Pendleton runway is classified as a Class "A" runway because fewer than 10 percent of the operations are from aircraft types requiring a Class "B" runway (i.e., heavy aircraft). DoD fixed-wing runways are separated into two classes for the purpose of defining accident potential zones (see Section 3.10).

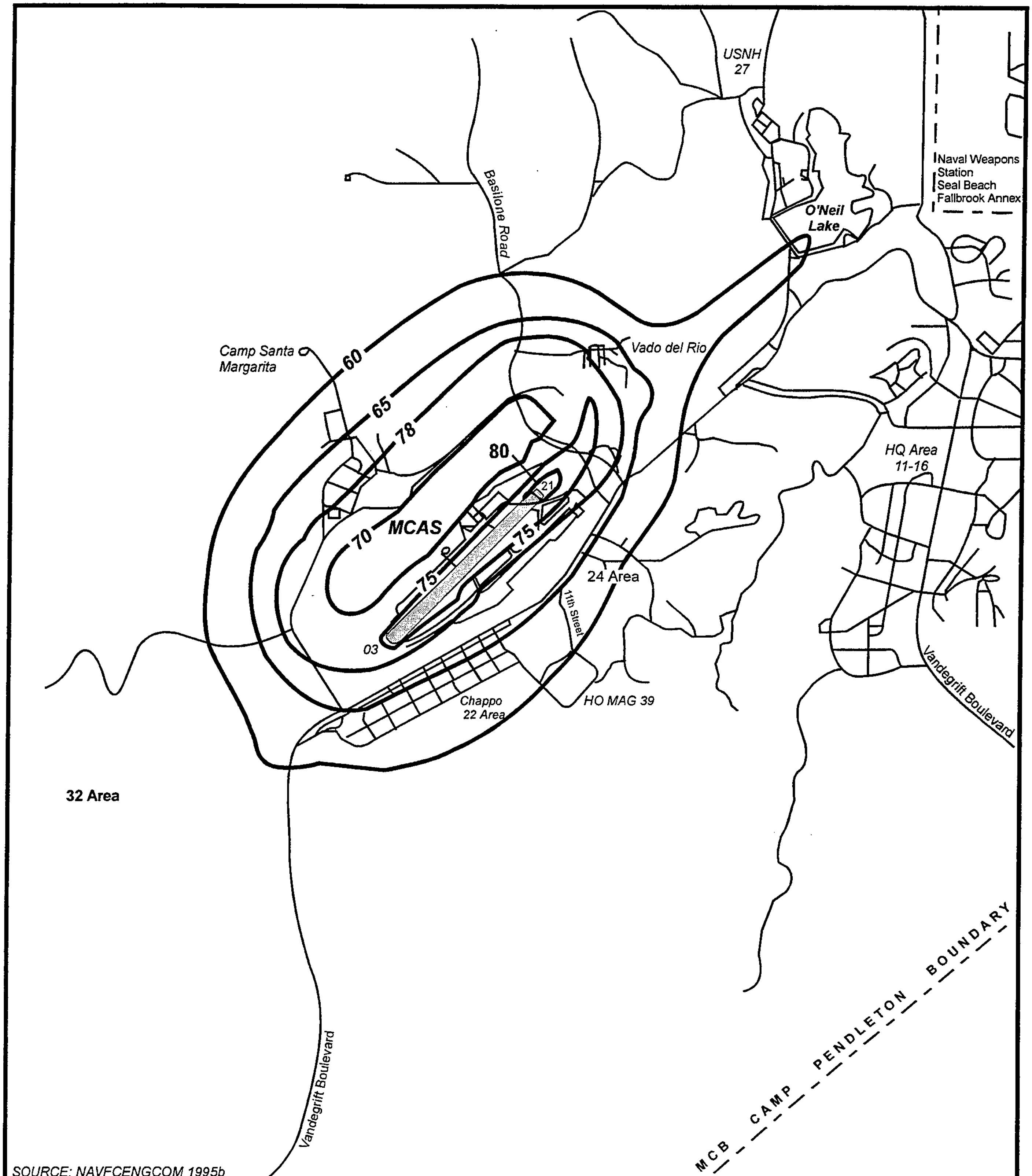
High-power ground runup operations are conducted at two locations on the airfield. One site is located adjacent to the north side of the west end of the runway. The other site is at the entry to the existing Compass Calibration Pad on the east side of the airfield along the main taxiway parallel to the runway.

An Aircraft Noise Study for MCAS Camp Pendleton was completed April 1995 for the Department of Defense Base Closure and Realignment Act of 1990 which directed the realignment of selected Marine Corps assets stationed at MCAS Tustin and MCAS El Toro to MCB/MCAS Camp Pendleton and MCAS Camp Pendleton (Wyle Research, 1995). MCAS Camp Pendleton, the Santa Margarita River north of MCAS Camp Pendleton, Vandegrift Boulevard, and a portion of the Chappo (22) Area are located within the 65 to 80 dB CNEL contours. The shape of the 65 dB CNEL contour to the north and northwest of the MCAS Camp Pendleton is reflective of the primary noise generators which are aircraft approaches and departures from Runway 21. Helicopter touch-and-go operations and high-power ground runup operations contribute to the higher noise levels (75 - 80 dB CNEL) and wider contour northwest of the runway.

Based on AICUZ land use compatibility guidelines, the airfield and airfield support land uses associated with MCAS Camp Pendleton, the warehousing activities associated with Chappo (22) Area, and maneuver and training activities associated with undeveloped areas are all compatible land uses within 65 to 80 dB CNEL noise contours.

3.6.3 Existing Noise Levels in the Project Area

The existing noise levels are shown in Figure 3.6-1. The proposed construction corridors for the flood control project would be located within 65 to 75 dB CNEL contours. The proposed construction areas for the flood control project directly north of MCAS Camp Pendleton would be almost entirely within 65 and 70 dB CNEL contours, except for the ends of each alternative levee alignment which would be within 60 dB CNEL contour. The proposed pump station would be located within 60 and 65 dB CNEL contours. The construction areas for the Basilone Road Bridge Replacement alternatives would be located within 60 and 65 dB CNEL contours.



SOURCE: NAVFCENGCOM 1995b

LEGEND

- MCB Camp Pendleton Boundary
- 03 / 21 Numbered Runway
- 60 CNEL Coutour Line
- Paved Road

SCALE IN FEET

0 4000 8000

Existing CNEL Contours MCAS Camp Pendleton

Figure 3.6-1

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3.7 AIR QUALITY

Ambient Air Quality Standards. The significance of air pollutant concentrations is determined by comparing the concentrations with an appropriate federal and/or state ambient air quality standard. These standards represent the allowable pollutant concentrations at which public health and welfare are protected and include a reasonable margin of safety. An area is designated by the U.S. Environmental Protection Agency (EPA) as being in attainment for a pollutant if ambient concentrations of that pollutant are below the National Ambient Air Quality Standards (NAAQS) and in nonattainment if violations of the NAAQS occur. Areas where insufficient data are available to make an attainment status designation are listed as unclassified. Unclassified areas are treated as attainment areas for regulatory purposes. The California Clean Air Act of 1988 also requires that areas of the state be designated attainment, nonattainment, or unclassified for state ambient air quality standards.

Federal and/or California state ambient air quality standards have been established for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter equal to or less than 10 microns in diameter (PM_{10}), lead, sulfate, hydrogen sulfide, and vinyl chloride. The NAAQS and California ambient air quality standards are presented in Table 3.7-1

Clean Air Act General Conformity Rule. On November 30, 1993, the EPA promulgated its rules for determining general conformity of federal actions with state air quality implementation plans as required by CAA Section 176(c). To demonstrate conformity with a local State Implementation Plan (SIP), a project must clearly demonstrate that it does not: 1) cause or contribute to any new violation of any standard in the area; 2) interfere with provisions in the applicable SIP for maintenance or attainment of air quality standards; 3) increase the frequency or severity of any existing violation of any standard; or 4) delay timely attainment of any standard, any interim emission reductions, or other milestones included in the SIP for air quality. The EPA has developed specific procedures for conformity determinations for federal actions which include preparing an assessment of emissions associated with the project based on the latest and most accurate emissions estimate techniques.

Existing Regional Air Quality. The airshed surrounding MCB Camp Pendleton is the San Diego Air Basin which includes all of San Diego County. MCB Camp Pendleton is located in the northwestern portion of San Diego Air Basin. The Basin has a serious nonattainment of federal standards designation for O_3, and a moderate nonattainment of federal standards designation for CO. The Basin is in attainment of federal standards for NO_2, SO_2, PM_{10}, and lead. Also, San Diego County is in attainment of state air quality standards for all pollutants with the exception of the state O_3, CO, and PM_{10} standards.

Table 3.7-1

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards		National Standards		
		Concentration	Methods	Primary	Secondary	Method
Ozone	1 Hour	0.09 ppm (180 μg/m3	Ultraviolet Photometry	0.12 ppm (235 μg/m3)	Same as Primary Standard	Ethylene Chemiluminescence
Carbon Monoxide	8 Hours	9.0 ppm (10 mg/m3)	Non-dispersive Infrared Spectroscopy (NDIR)	9 ppm (10 mg/m3)		Non-dispersive Infrared Spectroscopy (NDIR)
	1 Hour	20 ppm (23 mg/m3		35 ppm (40 mg/m3)		
Nitrogen Dioxide	Annual Average	-	Gas Phase Chemiluminescence	0.053 ppm (100 μg/m3)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.25 ppm (470 μg/m3)				
Sulfur Dioxide	Annual Average	-	Ultraviolet Fluorescence	80 μg/m3 (0.03 ppm)	-	Paraosoa-niline
	24 Hours	0.04 ppm (105 μg/m3)		365 μg/m3 (0.14 ppm)	-	
	3 Hours	-		-	1300 μg/m3 (0.5 ppm)	
	1 Hour	0.25 ppm (655 μg/m3)		-	-	
Suspended Particulate Matter (PM_{10})	Annual Geometric Mean	30 μg/m3	Size Selective Inlet High Volume Sampler and Gravimetric Analysis	-	–	Inertial Separation and Gravimetric Analysis
	24 Hours	50 μg/m3		150 μg/m3	Same as Primary Standard	
	Annual Arithmetic Mean	-		50 μg/m3		
Sulfates	24 Hours	25 μg/m3	Turbidimetric Barium Sulfate	-	-	-
Lead	30-day Average	1.5 μg/m3	Atomic Absorption	-	-	Atomic Absorption
		-		1.5 μg/m3	Same as Primary Standard	
Hydrogen Sulfide	1 Hour	0.03 ppm (42 μg/m3)	Cadmium Hydroxide Stractan	-	-	-
Vinyl Chloride (Chloroethene)	24 Hours	0.010 ppm (26 μg/m3)	Kevlar Bag Collection, Gas Chromatography	-	-	-
Visibility Reducing Particles	8 Hours (10 am to 5 pm, PST)	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent. Measurement in accordance with ARB Method V.		-	-	-

Source: California Air Resources Board, 1987.

Ambient air pollution concentrations in the San Diego Air Basin are measured at 10 air quality monitoring stations operated by the San Diego Air Pollution Control District (SDAPCD).The nearest SDAPCD air quality monitoring station to MCB Camp Pendleton is in Oceanside, approximately 7 miles south of the base. Monitoring data from the last 6 years, as published by the California Air Resources Board (CARB) and the SDAPCD, is summarized in Table 3.7-2.

Between 1989 and 1994, the state standard for respirable particulate matter (10-micron diameter or less particulate matter [PM_{10}]) was exceeded approximately 40 days per year, on average. The state standard for ozone (O_3) was exceeded approximately 10 days per year. The only federal standard exceeded at the Oceanside station was ozone, for an average of 5 days per year. This federal standard, however, was met for the first time in 1994, and was also met in 1995 according to a recent (January 18, 1996) news release from the SDAPCD. The state and/or federal standards for carbon monoxide (CO), sulfur dioxide (SO_2), and NO_2 have not been exceeded at the Oceanside station within the last 10 years.

Existing Emissions at MCAS Camp Pendleton and MCB Camp Pendleton. Emission sources associated with the existing use of MCAS Camp Pendleton and MCB Camp Pendleton consist of combustion emissions from aircraft engines, small stationary sources, ongoing construction activities, tactical equipment, ground support equipment, and civilian and military personnel vehicles commuting to, traveling within, and departing from the base. This section presents an estimate of air quality emissions at MCAS Camp Pendleton and MCB Camp Pendleton for the year 1990. The year 1990 best represents existing conditions for air emissions at MCAS Camp Pendleton and MCB Camp Pendleton and reflects the emissions inventory data developed for the SIP for the San Diego Air Basin. Table 3.7-3 presents the estimated annual emissions at MCAS Camp Pendleton and MCB Camp Pendleton, expressed in tons per year.

Table 3.7-2

Oceanside Air Quality Monitoring Station Summary[1]

Pollutant/Standard	1989	1990	1991	1992	1993	1994
Ozone						
1-Hour > 0.09 ppm[2]	21	14	14	12	7	2
1-Hour > 0.12 ppm[3]	8	4	3	2	4	0
1-Hour ≥ 0.20 ppm[4]	0	0	0	0	0	0
Max. 1-Hour Conc. (ppm)	0.9	0.17	0.16	0.15	0.16	0.12
Carbon Monoxide						
1-Hour > 20.0 ppm[2]	0	0	0	0	0	0
8-Hour > 9.0 ppm[5]	0	0	0	0	0	0
Max. 1-Hour Conc. (ppm)	8	6	7	7.	5	NA[6]
Max. 8-Hour Conc. (ppm)	4.1	4.0	3.3	3.9	3.3	3.9
Nitrogen Dioxide						
1-Hour > 0.25 ppm[2]	0	0	0	0	0	0
Max. 1-Hour Conc. (ppm)	0.23	0.18	0.13	0.19	0.12	0.12
Sulfur Dioxide						
1-Hour > 0.25 ppm[2, 7]	0	0	0	0	0	-
24-Hour >0.04 ppm[2, 7]	0	0	0	0	0	-
Max. 1-Hour Conc. (ppm)	0.02	0.02	0.02	0.02	0.02	-
Max. 24-Hour Conc.(ppm)	0.011	0.018	0.010	0.012	0.012	-
Respirable Particulates(PM_{10})						
24-Hour > 50 μg/m[2]	14/61	6/61	9/60	0/57	2/61	NA
24-Hour > 150 μg/m[3]	0/61	0/61	0/60	0/57	0/61	NA
Max. 24-Hour. Conc. (μg/m)	89	115	81	47	68	75

Notes: [1]Days exceeding federal and state standards and maximum observed concentrations.
[2]California state standard. Not to be exceeded.
[3]National ambient air quality standard. Not to be exceeded more than once per year.
[4]California first-stage smog alert level.
[5]State and federal standard.
[6]NA = No data available.
[7]Monitoring for SO^2 discontinued in mid-1993. No data available for 1994.

Source: California Air Resources Board, Summary of Air Quality Data, 1987-1993. Chula Vista APCD Monitoring Station (except for some particulate data which are from San Diego APCD Downtown Station.).

Table 3.7-3

Summary of 1990 Annual Air Emissions at MCAS Camp Pendleton and MCB Camp Pendleton

	Emission Rates (tons per year)				
Emission Source	NO_x	CO	ROG/HC	SO_x	PM_{10}
Aircraft Type					
AH-1N	19.59	78.13	17.49	2.55	13.02
UH-1N	8.24	8.57	1.73	1.02	11.29
CH-46E	41.03	44.22	3.92	2.50	9.02
CH-53E	0.81	3.03	1.15	0.08	0.63
CH-46 other	0.30	1.13	0.26	0.02	0.13
OV-10	26.37	51.07	12.34	1.25	1.55
Construction Activities	23.10	18.70	3.43	1.89	1.47
Personal and Government-owned Vehicles:					
Personal Vehicles	57.94	786.89	87.20	1.92	6.93
Government-owned vehicles	0.33	1.57	0.21	0.02	0.07
Tactical Equipment/GSE	75.25	158.34	50.79	5.63	5.91
Stationary Sources	9.32	2.37	0.84	0.90	0.11
Total Emissions	262.28	1154.02	179.36	17.78	50.13

Note: Aircraft emission data reviewed by AESO
Source: Base closure and Realignment EIS, 1996

Notes:
- CO — Carbon monoxide
- SO_x — Sulfur oxides
- ROG/HC — Reactive Organic Gases/Hydrocarbons
- PM_{10} — Particulate matter less than 10um in diameter
- NO_x — Nitrogen oxides

Calendar year 1990.

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3.8 CULTURAL RESOURCES

3.8.1 Introduction

Cultural resources consist of prehistoric, historic, and traditional cultural properties. Prehistoric resources are physical properties resulting from human activities predating written records, identified as either isolated artifacts or sites. Sites contain concentrations of artifacts (e.g., stone tools and ceramic shards), features (e.g., campfires and houses), and floral and faunal remains. Historic resources consist of physical properties that postdate the existence of written records. Historic resources include architectural structures (e.g., buildings, dams, and bridges) and archaeological features such as foundations, and trash dumps. Cultural resources are protected primarily through the *National Historic Preservation Act of 1966* as amended, and its implementing regulations, *Protection of Historic Properties* (36 CFR 800).

Sites, areas, and materials may be important to Native Americans for religious or heritage reasons. Resources may include prehistoric sites and artifacts, sacred areas, traditional use areas (e.g., native plant habitat), and sources for materials used in the production of sacred objects and traditional implements. Although some site types within this element overlap with prehistoric and historic resources, they require separate recognition. The *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (Parker and King, 1990) provide information on the treatment of Native American sites which may be considered eligible for the National Register of Historic Places (NRHP) and are designated "traditional cultural properties." Other legislation regarding Native American issues includes American Indian Religious Freedom Act (AIRFA) of 1978, and the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990.

3.8.2 Background

Prehistoric Chronology. In general, the prehistory of northern San Diego can be separated into four periods, beginning with a controversial Late Pleistocene occupation, followed by the Early and Middle Holocene occupations, and ending with the Late Holocene occupation. These periods are also based on the assumed hunting system in use at the time. The first period, Late Pleistocene, is described as a "pre-projectile" phase. The second, Early Holocene, is the period of time when the thrusting spear was the primary weapon. The third period, Middle Holocene, is the Archaic period during which the atlatl-and-dart was used for hunting. During the Late Holocene period, the bow-and-arrow replaced the atlatl-and-dart as the primary hunting weapon.

Late Pleistocene (40,000 - 10,000 years Before Present [BP]). The Late Pleistocene is generally described as the period starting 10,000 years ago and ending 40,000 years BP. Although some researchers place the first occupation of the San Diego region at around 40,000 years ago, evidence

to support this claim is tenuous. The occupation is called the "pre-projectile" period because projectile points of any type are noticeably absent from sites of this period. The locales attributed to occupation from this period generally are cobble layers and the "artifacts" ascribed in the assemblages are "core" or "cobble" tools. Sites purportedly dating to this phase in the Santa Margarita River Basin include one located along the terraces near the mouth of the Santa Margarita River. No indisputable archaeological dates for the sites have been obtained, and the cultural nature of the assemblages has been questioned.

Early Holocene (10,000 - 7500 years BP). The Early Holocene period is the earliest reliably dated occupation of the San Diego region (ranging from 7,500 to 10,000 years BP). This phase has been called Early Man and San Dieguito. This phase has been known to produce artifact assemblages composed of biface points and knives including Silver Lake points, crescents, cobble tools, milling equipment, a variety of flake tools, and bone tools. At Agua Hedionda, located about 5.5 miles south of Camp Pendleton, Early Holocene artifact assemblages are associated with the remains from shellfish, birds, and both land and ocean mammals.

Middle Holocene (7500 - 1300 years BP). An increase in the number of sites with archaeological attributes to the Middle Holocene has led researchers to suggest that an influx of population occurred around 8,000 years ago. This time period marked the emphasis of exploitation of shellfish and included the occupations attributed to the coastal people. Other names used for this time period include Millingstone, Encinitas, Encinitas I and II, La Jolla for the coastal region, and Pauma for the inland regions. Diagnostic artifacts include large crudely fashioned projectile points, doughnut stones, clogged stones, discoidals, and plummet stones. The occurrence of tarring pebbles and basketry impressions in asphaltum documented the use of baskets. It has been suggested that the subsistence was based on collecting seeds and shellfish, with a reduced emphasis on hunting and fishing.

Late Holocene (1300 - 200 years BP). Occupation during the late Holocene has been viewed as an occupation by populations migrating from the desert to the coast, an incursion called the "Shoshonean Wedge." The new populations occupied the area now known as northern San Diego County, Orange County, and Los Angeles County. The artifact assemblage includes ceramics, arrow points, bedrock mortars, milling equipment, and numerous shell and bone ornaments and tools.

This time period was subsequently separated into the San Luis Rey I and San Luis Rey II for northern San Diego County (True, *et al.*, 1974; True, 1966; Meighan, 1954). San Luis Rey I is defined by small triangular points called "Cottonwood Triangular," numerous small disk shell beads, steatite disk beads, an increase in the use of obsidian, specifically from Obsidian Butte on the southern edge of the Salton Sea, steatite arrow shaft straighteners, and numerous bone tools and ornaments. The

assemblage for San Luis Rey II included all of the artifacts ascribed to San Luis Rey I, but with the addition of ceramics in the form of vessels, pipes, and figurines.

True (1966) further separated the northern occupation, San Luis Rey, from the southern occupation, Cuyamaca, based on the ratio of Cottonwood Triangular points to Desert Side-notched points and on the amount of steatite and ceramic artifacts. According to True (1966), sites related to the Cuyamaca Complex contain more Desert Side-notched points than Cottonwood Triangular points, considerably more steatite ornaments, and numerous ceramic artifacts. In contrast, San Luis Rey sites were said to contain numerous Cottonwood Triangular points and few Desert Side-notched points, very few ceramics, and only an occasional steatite object.

Ethnohistory. The region which includes the proposed project areas was populated by Native Americans called the "Luiseño," a Spanish name given to those native populations associated with Mission San Luis Rey. The language of the Luiseño is part of the Cupan group of the Takic subfamily, a member of the Uto-Aztecan family (Bean and Shipek, 1978).

The settlement pattern of the Luiseño, prior to Euroamerican intrusion, was described as sedentary villages with specific hunting, collecting, and fishing areas situated in diverse ecological zones (Bean and Shipek, 1978). It has been suggested that the pattern included two or more permanent base camps with a number of associated special purpose sites such as quarry sites, hunting blinds, and milling sites (True et al., 1974; True and Waugh, 1982). The winter base camp, occupied 4 to 6 months a year, was the location where most ceremonies took place. The summer-fall camp was the acorn-collecting and hunting area, usually located near an oak grove.

The Luiseño culture was geared to a simple hunter/gatherer economy but was rich in oral traditions and rituals. The multiple environmental zones ensured that time of scarcity in one zone could be supplemented with products from another vegetal zone. Shellfish, fish, acorns, grass seeds, herbs, and game provided a rich and varied diet (Bean and Shipek, 1978). Merriam (1979) and Sparkman (1908) collected lists of these plants and animals used by the Luiseño.

The territory of the Luiseño stretched from Agua Hedionda Lagoon in the south inland along Agua Hedionda Creek to include Mount Palomar and the northern tip of the valley of San Jose, then northward just east of Elsinore Valley, turning toward the coast at Santiago Peak, and following Aliso Creek, Orange County, to the coast (Bean and Shipek, 1978).

White (1963) estimated that at the time of contact (the late 1700s), the Luiseño population totaled about 10,000 persons. The introduction of European diseases decimated the population, especially for those native peoples forced to live at the missions. Many of the coastal natives were taken to San Juan Capistrano. However, the policy of Mission San Luis Rey encouraged the natives to maintain

their own settlements and subsistence practices. When the missions were secularized in 1834, many of the natives turned to the Mexican ranchos for employment, although those living in wilderness areas were able to maintain their life style. When California became part of the United States, and homesteaders moved into the area, many of the open ranges were fenced off, and the areas traditionally used for hunting and gathering were no longer available. Although the reservations were established to offset this encroachment, they instead forced many natives to adopt a more sedentary life style based on Euroamerican economics as an alternative to moving to the reservations.

Local History. The history of San Diego County reflects Spanish, Mexican, and American land use and political rule since 1769 and the involvement of native inhabitants throughout all periods. Certain themes are common to all periods of political occupation, such as the development of travel and transportation routes, settlement, and agriculture.

The Spanish period (1769-1821) represents: exploration; establishment of the San Diego Presidio, San Diego, and San Luis Rey missions and mission outposts; the introduction of horses, cattle, and agricultural products; and a new architectural style and method of building construction. Spanish influence continued beyond the year 1821, when California came under the domination of Mexico.

The Pueblo of San Diego was established during the Mexican Period (1821 - 1848). Retention of Spanish laws and practices continued at the local missions in 1834. Vast tracts of land were granted by the government to political leaders and their relatives, former members of the military, and settlers. Prior to mission secularization, only 50 rancho grants were issued to Spanish and Mexican citizens. However, more than 750 grants were issued in the 13 years between the secularization act and the American conquest (Wee and Mikesell, 1994). The grant for Rancho Santa Margarita y Las Flores was issued in 1841 to Pio and Andres Pico (Wee and Mikesell, 1994). Throughout the Mexican Period, cattle grazing prevailed over agricultural activities and the hide and tallow trade served as the major economic activity. The rancho land holding pattern was firmly established by the time the Mexican Period ended as a result of the Mexican American War.

The American Period (1848 - present) began when Mexico ceded California to the United States under the Treaty of Guadalupe Hidalgo in 1848. Terms of the Treaty, and the subsequent Act of 1851, brought about the creation of the Lands Commission with the responsibility for validating land ownership throughout the state, particularly of ranch lands. Although a number of the Mexican land grants were validated, few remained intact. Invalidated land grants became public lands available for settlement by residents and new emigrants to California.

Thirty-one land grants issued in San Diego County were confirmed by the American Ninth Circuit Court under the Land Act of 1851 including the Rancho Santa Margarita (Wee and Mikesell, 1994). Between 1841 and 1844, a residence, outbuildings, and other improvements were constructed at Rancho Santa Margarita by Pio Pico. Subsequent residents of Rancho Santa Margarita included and Jose Antonio Pico (1849-1853), Don Jose Joaquin Ortega (1854-1864), Juan Forster (1864-1882), Richard O'Neill (1882-1910), Jerome O'Neill (1910-1926). In 1920, the Santa Margarita Corporation was established by the Flood family, heirs of Richard O'Neill's partner.

The economy of Rancho Santa Margarita was based on raising domestic animals, primarily cattle, throughout the Spanish and Mexican periods. Cultivation of crops for commercial purposes did not take place until the American Period. Cattle grazing and crop production prevailed until 1942 when Rancho Santa Margarita was acquired by the United States government during World War II for wartime use by the Marine Corps. The rancho land, which totaled 121,387 acres (49,162 hectares), was immediately transformed into a training base named after Marine Corps Major General Joseph H. Pendleton. Camp Pendleton became a permanent military installation in 1944 and the center of Marine Corps activity on the Pacific Coast. Since World War II, Marines have been deployed from Camp Pendleton throughout the world in response to potential and actual conflicts. Camp Pendleton is the largest amphibious training base on the west coast.

3.8.3 Previous Research

A records search for previously recorded sites and cultural resources investigations, and archival research for historic resources were conducted (Gallegos & Associates, 1995; 1997a). Prior to the field survey, existing records were reviewed to determine previously recorded sites and previous investigations in the proposed project areas. Site records and previous surveys on file at the South Coastal Information Center, San Diego State University, and the San Diego Museum of Man were examined. The California Historic Landmarks and NRHP were also assessed for prehistoric and historic sites in the proposed project areas (Gallegos & Associates, 1995). Additional information was obtained from the Office of Resources Management and the Office of Historic Properties at Camp Pendleton. The total number of known cultural resources for the Santa Margarita River Valley include 66 prehistoric sites, 6 historic sites, and 9 multicomponent sites containing both prehistoric and historic materials.

Previous research in the Santa Margarita River drainage includes numerous surveys and site testing to determine horizontal and vertical extent of buried deposits. The first surveys were completed by avocational archaeologists in the 1930s and 1940s and by San Diego State College and California

State College, Long Beach in the 1960s, 1970s and 1980s (Gallegos & Associates, 1995). Project specific surveys were conducted in the 1980s and 1990s in compliance with Section 106. Recent investigations include the Phase I survey of 5,000 acres in the Santa Margarita River valley (Gallegos & Associates, 1995), archaeological significance testing at site CA-SDI-10156/SDI-12599/H by LSA Associates (Strudwick *et al.*, 1995), inventory and site evaluation for the Sewage Effluent Compliance Project by KEA Environmental, Inc. (Pigniolo and Cleland, 1996), and site evaluation for five sites in the Santa Margarita Flood Control Project (Gallegos & Associates, 1997a).

3.8.4 Field Methods

Inventory. The pedestrian inventory was conducted using parallel transects with the crew spaced 10 to 20 meters apart, depending on the terrain and vegetation. In areas of development, such as the MCAS Camp Pendleton and Chappo (22) Area, only those portions that appeared to be undisturbed were surveyed. A cursory survey was conducted in those areas where aerial photographs indicated considerable landscape alteration. Special efforts were made to relocate previously recorded sites, particularly those lacking complete records. When a site was located, it was surveyed intensively for artifacts and ecofacts, and each item was flagged with surveyor's tape. In addition, a site map was drawn to scale defining the site limits, and a field site form was completed. A datum stake with the site designation was placed at the approximate center of the site. Photographs were taken of the site area. If features were present, they were drawn to scale and additional closeup photographs were taken (Gallegos & Associates, 1995).

Evaluation. The test methods for prehistoric sites differed depending upon the site type and surface manifestations. The field methods combined surface collections, shovel test pits (STPs), excavation units (1 by 1 meter square), and backhoe trenching for determining site limits and context; although not all approaches were used at each site. Field notes, photographs, and drawings were used to record ongoing field research. All material recovered in the field was appropriately bagged and transported to archaeological laboratory facilities for washing and cataloging. In-depth analyses of artifactual and ecofactual material was conducted including appropriate special analyses (e.g., radiocarbon dating, faunal analysis, obsidian sourcing and hydration rind analysis) (Gallegos & Associates, 1997a).

Methods for evaluating historic sites included field examination and documentation, and archival research.

3.8.5 Inventory Results

The inventory report, *Cultural Resource Inventory of the Santa Margarita River Valley, Camp Pendleton* (Gallegos & Associates, 1995) documents the background, methods, and results of an

archaeological assessment undertaken at Camp Pendleton for the Santa Margarita River Flood Control and Basilone Road Bridge Replacement projects. For this assessment, the Santa Margarita River Valley was surveyed in its entirety (over 5,000 acres) for cultural resources. The survey resulted in the redocumentation of 36 previously recorded sites and the recordation of 45 new sites. No isolates were recorded. Additional cultural resources investigations include a survey for proposed onbase borrow locations, and the Rattlesnake Canyon Road alignment (Gallegos & Associates, 1997a, Appendix B).

3.8.6 Evaluation Results

Information regarding the National Register eligibility of five sites (CA-SDI-13986, CA-SDI-13987, CA-SDI-13989, CA-SDI-13993/H, and CA-SDI-14005-H) in the project areas is based on the draft report, *Historical/Archaeological Test Report for Five Sites Within the Santa Margarita Flood Control Project, San Diego County, California* (Gallegos & Associates, 1997a).

3.8.7 Cultural Resources in the Area of Potential Effect (APE)

Six prehistoric sites, one historic site, and two multicomponent sites are located within the APE for the proposed project (Table 3.8-1). Four sites are considered eligible for the NRHP. Five sites are considered not eligible. The Santa Margarita Ranch House complex is listed on the NRHP.

Table 3.8-1

Cultural Resources Located in the Area of Potential Effect

Site Number	Site Type	Description	National Register of Historic Places Status
CA-SDI-10156/12599/H	Multicomponent	Luiseño Village *Topamai*, and Santa Margarita Ranch House complex	Eligible
CA-SDI-12628	Prehistoric	Shell Midden	Eligible
CA-SDI-13982	Prehistoric	Milling Station	Not Eligible
CA-SDI-13986	Prehistoric	Habitation	Eligible
CA-SDI-13987	Prehistoric	Redeposited Scatter	Not Eligible
CA-SDI-13989	Prehistoric	Milling Station	Not Eligible
CA-SDI-14060	Prehistoric	Shell Midden	Not Eligible
CA-SDI-13993/H	Multicomponent	Military/Milling Station	Not Eligible
CA-SDI-14005-H	Historic	California Southern Railway Segments A and B	Eligible

Sources: Gallegos & Associates, 1997a, b; Pigniolo and Cleland, 1996.

Site CA-SDI-10156/12599/H is a multicomponent site eligible for the NRHP under Criteria A, B, C, and D. The prehistoric subsurface deposit extends north of Basilone Road and has been identified as the probable location of the Luiseño village of *Topamai* (Strudwick *et al.*, 1996). A mission outpost was constructed at the Indian Village of *Topamai* by the Spanish. The construction of this outpost established a direct link between the Mission San Luis Rey and the aboriginal population at *Topamai* which resulted in permanent and probably direct European cultural influences on the local population. Archaeological testing to determine the surface and subsurface extent, content, and integrity of this site has been completed (Strudwick *et al.*, 1996). Three primary subsurface prehistoric concentrations were identified. The excavated assemblage consists of chipped stone and groundstone artifacts, marine shell, faunal remains, and human cranial fragments (Strudwick *et al.*, 1996). Diagnostic artifacts recovered included Cottonwood series arrow points and locally manufactured Brown Ware ceramics indicative of a Late Period habitation.

The historic component consists of site CA-SDI-10156/12599/H, the historic Santa Margarita Ranch House complex, that is now MCB Camp Pendleton Commanding General's residence. The Santa Margarita Ranch House complex is listed on the NRHP. A district has been recommended and consists of 21 acres (8.5 hectares), including three primary adobe-walled buildings and three miscellaneous structures (Gallegos & Associates, 1995:4-31). The Santa Margarita Ranch House complex is eligible for the NRHP based on its significance in social history (association with two of the most prominent Mexican ranching families [Pico and Forster]; association with the role of English-speaking immigrants in developing the ranchos in the late Mexican and early American periods [Forster]; and association with the persistence of the rancho economy and culture), its significance in architecture (domestic architecture of Hispanic California), its significance in conservation (1942-1943 historic preservation and restoration), and its significance in archaeology (Mission-era, Pico era, Forster era, and historic building practices).

The test excavation report for the chapel identifies prehistoric ceramics, a volcanic flake, a retouched volcanic flake, a hammerstone, and pieces of marine shell recovered to a depth of 1 meter (Schaefer, 1993). These may have eroded from the adobe bricks, which contained prehistoric material but could also be indicative of a prehistoric deposit under the historic adobe. Excavations were not conducted below the historic levels (Schaefer, 1993).

Site CA-SDI-12628 is a large site encompassing an area of 56,250 square meters, but containing a sparse shell scatter. The artifactual assemblage was limited to 6 flakes and approximately 50 pieces of shell with *Donax* sp., *Chione* sp., and *Argopecten* sp. present. Testing revealed an intact buried deposit under 1 meter of fill, containing milling implements, core/cobble tools, debitage, and faunal remains. The faunal remains included freshwater musselshell, saltwater shell, saltwater fish and terrestrial animals. Radiocarbon dating indicated a late mid-Holocene occupation (Pigniolo and Cleland, 1996). The site is considered eligible for the NRHP (Pigniolo and Cleland, 1996).

Site CA-SDI-13982 consists of a mano, a pestle, two pestle fragments, and a metate fragment in a dirt road. Testing has been conducted, and the site has been recommended as not eligible for the NRHP (Pigniolo and Cleland, 1996).

Site CA-SDI-13986 is an extensive prehistoric site located on the upper two terraces, west of the Santa Margarita River. A dispersed scatter of artifacts was found covering a 190- by 140-meter area. The area has been heavily graded, with artifacts scattered by grading. In addition, some fill appears to be present, and numerous gullies were noted across the site. In spite of the disturbance, intact midden is present. A feature consisting of fire-affected rock, a hammerstone, and a possible mano is located at a depth of 70 cm in one of the erosional gullies.

Three temporally diagnostic artifacts were found on the surface: two discoidals and one large point fragment diagnostic of the Middle Holocene period. Other artifacts in the assemblage include manos ranging from trifacially shaped manos to unifacially used. Numerous metate fragments, hammerstones and hammerstone fragments, core/cobble tools, and cores are also present. The debitage includes metavolcanic, crystalline quartz, quartzite, metasedimentary, basalt, and quartz lithic materials. Only one piece of shell, a *Chione* sp. fragment, was observed on the surface, although fire-affected rock and burnt bone are present. The assemblage is similar to that defined for the Middle Holocene, and the site appears to be a major habitation of that period. Testing has been conducted and the site has been recommended as eligible for the NRHP (Gallegos & Associates, 1997a).

Site CA-SDI-13987 is a small scatter located on the floodplain, consisting of a core/hammerstone, a hammer/knapper, two ceramic sherds, a metate fragment and lithic debitage. Extensive test excavations indicated that this site is redeposited, and therefore lacks any physical integrity. This site has been recommended as not eligible for the NRHP (Gallegos & Associates, 1997a).

Site CA-SDI-13989 is a milling site consisting of two milling slick features, a biface, a mano, two mano fragments, and debitage. Test excavations indicated a shallow prehistoric deposit with mixed historic/recent debris. This site has been recommended as not eligible for the NRHP (Gallegos & Associates, 1997a).

Site CA-SDI-14060 is a buried deposit of shell which may be an extension of Site CA-SDI-12628. The site is a shell midden with *Donax* sp., *Chione* sp., and *Argopecten* sp. present. Although fire-affected rocks are present, no artifacts were found. Testing has been conducted and the site has been recommended as not eligible for the NRHP (Pigniolo and Cleland, 1996).

Site CA-SDI-13993/H is located on the slope of the first terrace above the Santa Margarita River floodplain. The historic component of this site consists of a rectangular rock alignment and a

semicircle of rocks around a foxhole. Historic artifacts include tin cans, red brick fragments, barbed wire, and an aluminum military canteen. The prehistoric component includes four milling features, nine groundstone implements, two hammerstones, and debitage. Test excavations indicated a shallow prehistoric deposit with some mixed historic debris. This site has been recommended as not eligible for the NRHP (Gallegos & Associates, 1997a).

Site CA-SDI-14005-H is a linear site representing the California Southern Railway Route, originally built in 1882. It was the fourth intercontinental railroad. The rail line started in National City, followed the coast north to Oceanside, where it curved to the northeast and followed the Santa Margarita River Valley past Fallbrook to Temecula Canyon. Construction of the railroad line along the Santa Margarita River began in 1881, contrary to local residents' warnings regarding seasonal flooding of the river. Train service using this line commenced in 1882. Heavy rains in the winter of 1883-1884 weakened the track and washed out several bridges. Train service was restored in 1885. The track washed out again in 1891 and service was restored only to Fallbrook from the north. In 1916, the line was again destroyed and a new line was constructed on higher ground (Gallegos & Associates, 1997b).

The route of the railroad through the valley was divided into three segments for recording purposes. Segments A and B are located within the proposed project areas and consist of the original route of the California Southern, a vital link in Atchison, Topeka, and Santa Fe's transcontinental railroad route between 1882 and 1891 (Gallegos & Associates, 1997b). Segment A, approximately 7.5 miles long, runs from Oceanside to the Santa Margarita Ranch House complex. Most of this segment is still in place, although it is in poor condition. It follows the south and east side of the river valley and was the route for both the pre-1916 rail line and the post-1916 rail line. Several portions of the track in the northern part of Segment A were removed as a result of the 1993 flood and subsequent base improvements (Gallegos & Associates, 1997b).

Segment B is that portion of the rail line that existed prior to 1916 and is the northern portion of the California Southern route. Prior to 1916, the rail line crossed the Santa Margarita River near the Santa Margarita Ranch House complex and continued up the west and northern side of the valley, following the Santa Margarita River to a point north of Fallbrook. Portions of the track were flooded out in 1884 but were immediately rebuilt (Segments A and B). When the track washed out in 1916, the northern portion (Segment B) was abandoned and replaced with a new route (Segment C) (Gallegos & Associates, 1997b). Physical manifestations of Segment B are limited and include railroad spikes, wooden posts, blasting holes, and railroad cuts. Archaeological remains of Segment B do not occur in the proposed project areas. Segments A and B of site CA-SDI-14005-H, which represent the 1880s California Southern Railroad route, are considered eligible for the NRHP (Gallegos & Associates, 1997b).

Segment C represents the railroad route established after the 1916 flood. This route continues along the east and south side of the valley past the Santa Margarita Ranch House complex where it turns inland south of O'Neill Lake. Segment C does not occur in the proposed project area. Segment C does not meet the criteria for the NRHP (Gallegos & Associates, 1997b).

Traditional Cultural Properties. A traditional cultural property is defined as a resource that is eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community (Parker and Kane, 1990) No traditional cultural properties have been identified in the APE. However, features and buried deposits important to Native Americans may occur in the prehistoric component of site CA-SDI-10156/12599/H and represent concerns under the Native American Graves Protection and Repatriation Act.

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3.9 AESTHETICS AND VISUAL RESOURCES

3.9.1 Definition of Resource

Visual resources are defined as the natural and manmade features that constitute aesthetic qualities and values of an area. These features form the overall impression that an observer receives when viewing an area. Landforms, water surfaces, vegetation, and existing structures are considered visual resources if they are distinctive elements of the visual character.

The visual importance or sensitivity associated with the visual resources of an area determines whether a change in character would or would not be considered a significant effect. Visual sensitivity is determined by the overall visual character of an area, number of viewers with access to the resources, and duration of the views offered of the scene. High visual sensitivity exists in areas where views are rare, unique, or in other ways special, such as in remote or pristine environments. High visually sensitive views would include landscapes that consist of landform, vegetative patterns, water bodies, or rock formations of unusual or outstanding quality. High visually sensitive localities would also include natural coastlines, streams and river corridors, designated historic districts, and designated scenic vistas.

Medium visually sensitive areas are more developed than those areas of high sensitivity. Human influence is more apparent in these areas, and the presence of motorized vehicles and other evidence of modern civilization is common. These landscapes generally have features containing varieties in form, line, color, and texture, but tend to be more common than high visually sensitive areas.

Low visually sensitive areas tend to have minimal landscape features, with little change in form, line, color and texture. Low sensitive areas would be typical urban or suburban areas, agricultural and farming areas, industrial or commercial development areas, and other areas that do not contain resources described as medium or high sensitivity areas.

Observers are typically considered sensitive visual receptors when perceptible changes in visual character would contrast and detract from a scenic landscape. Certain activities tend to heighten viewer awareness of scenic resources, while others tend to be distracting. For example, people who are camping, picnicking, or driving along a formally recognized scenic roadway are more likely to notice changes in the surrounding character than commuters traveling at high speeds on an interstate highway.

MCB Camp Pendleton acknowledges the visual character and design concepts of the military base in the Base Exterior Architectural Plan (BEAP). The BEAP contains design guidelines to be employed for all new development, replacement, repair, and maintenance projects. The guidelines

contain recommendations on architecture, landscape management, signage, and lighting which are consistent with the aesthetic values or themes of the natural and manmade environment.

The visual character of the project site was identified through field observations and a review of visual resources documented in the BEAP.

3.9.2 Existing Visual Character

The visual character of the project area includes natural features and human modifications that are primarily reflective of the use of the land as a military installation. The project area is situated on the relatively flat river wash area (100-year floodplain) of the Santa Margarita River in a canyon flanked by low rolling hills that are typical throughout MCB Camp Pendleton. Airfield elevation at MCAS Camp Pendleton is 75 feet above mean sea level, with a predominate gentle slope of less than 3 percent. The Santa Margarita River channel is intermittent near MCAS Camp Pendleton, consisting of a wide, dry, sandy wash most of the year with an occasional pond. Along the sides of the river channel are areas of willow riparian habitat. A 15-foot-high dike extends along the northern perimeter of the airfield. Dry grassland fields containing some shrubs are located between the existing temporary levee and the airfield.

The developed areas in this portion of the Santa Margarita River valley (described in Section 3.4) consist of clusters of buildings and other structures, and large expanses of paved and unpaved surfaces surrounded by native and/or landscaped vegetation. The visual features in this portion of the river valley are fairly common to the region. In areas where extensive disturbance or development has occurred, the visual features are not unique or particularly scenic. Overall, the project area would be considered to have a low sensitivity value for aesthetics and visual resources.

3.9.3 Existing Views

The proposed project would be constructed entirely within the boundaries of MCB Camp Pendleton. The proposed project areas are not visible from offbase because of the location and the topography within the Santa Margarita River valley. In addition, views of the proposed project areas are limited due to the topography of the river valley, natural and landscaped vegetation, and the developed facilities and structures in the MCAS Camp Pendleton, Chappo (22 and 24) Areas, Vado Del Rio (25) Area, and the Santa Margarita Ranch House complex listed on the NRHP. The following is a summary of the existing views to the proposed project areas discussed by project component.

Levee Alignments. Views at the proposed project areas for Levee Alignments 1, 2, and 3 and are predominantly undeveloped portions of the Santa Margarita River with visual components including a river bed, sandy embankments, riparian vegetation, and riparian woodland. The proposed project

area also includes a temporary levee structure surrounding the Santa Margarita Ranch House complex north of Basilone Road.

Views of the proposed levee alignments would be visible to motorists on Vandegrift Boulevard, Basilone Road, and Stagecoach Road as well as to base personnel and visitors from MCAS Camp Pendleton, Chappo (22 and 24) Areas, Vado Del Rio (25) Area, and the Santa Margarita Ranch House complex. Views of the proposed levee alignments would be blocked from motorists on Vandegrift Boulevard and portions of the Chappo (22 and 24) Areas by STP No. 3 and MCAS Camp Pendleton which has dominant landscape features including an aircraft runway, control tower, aircraft hangars, and aircraft maintenance facilities.

River Training Structures: Spur Dikes and Silt Fences. Views at the proposed areas for the river training structures are predominantly undeveloped portions of the Santa Margarita River north of Basilone Road and the Santa Margarita Ranch House complex. The visual components of the Santa Margarita River include the river bed, sandy embankments, riparian vegetation and riparian woodland. Views of the proposed project areas would be visible to motorists on Vandegrift Boulevard and Basilone Road as well as to base personnel and visitors from the MCAS Camp Pendleton, Chappo (24) Area, Vado Del Rio (25) Area, the Santa Margarita Ranch House complex and O'Neill Lake. Views of the proposed levee alignments would be blocked from motorists on Vandegrift Boulevard and portions of the Chappo (22 and 24) Areas by STP No. 3 and MCAS Camp Pendleton which has dominant landscape features including an aircraft runway, control tower, aircraft hangars, and aircraft maintenance facilities.

Borrow Sites. Views at the proposed project areas for the borrow pit sites are predominantly undeveloped or disturbed hillsides with sparse vegetation. Views of the proposed borrow pit site at East Oscar would be partially visible to base personnel using the Wilcox Range. The borrow pit site at Chappo (22) Area would be partially visible to base personnel and visitors from limited portions of the east end of the Chappo (22) Area.

Stormwater Management System - Pump Station. Views at the proposed project areas for the pump station are of disturbed areas surrounding STP No. 3 and undeveloped portions of the Santa Margarita River with visual components including riparian vegetation and woodland. Views of the proposed pump station would be visible to motorists on Vandegrift Boulevard, and base personnel and visitors to MCAS Camp Pendleton and the Chappo (22) Area.

Bridge Alignments. Views at the proposed project areas for Bridge Alignments A and B would predominantly be the existing Basilone Road, which includes roadway approaches and a temporary two-lane bridge crossing the Santa Margarita River. Views at the proposed project area for Bridge Alignment B would include the temporary levee structure and horse riding field adjacent to the Santa

Margarita Ranch House complex. Views at Bridge Alignment C would be predominantly undeveloped portions of the Santa Margarita River with visual components including a river bed, sandy embankments, riparian vegetation, and riparian woodland.

Views of the proposed bridge alignments would be visible to motorists on Vandegrift Boulevard and Basilone Road as well as to base personnel and visitors to MCAS Camp Pendleton, Chappo (22 and 24) Areas, Vado Del Rio (25) Area, and the Santa Margarita Ranch House complex.

3.10 SAFETY AND ENVIRONMENTAL HEALTH

3.10.1 Definition of Resource

This section addresses the potential for the proposed project to affect the health and safety of persons living, working, or visiting at or in the vicinity of MCAS Camp Pendleton and MCB Camp Pendleton, including military personnel and civilians. Specific topics addressed include hazards associated with airfield safety, APZs, explosives safety, and hazardous materials contamination.

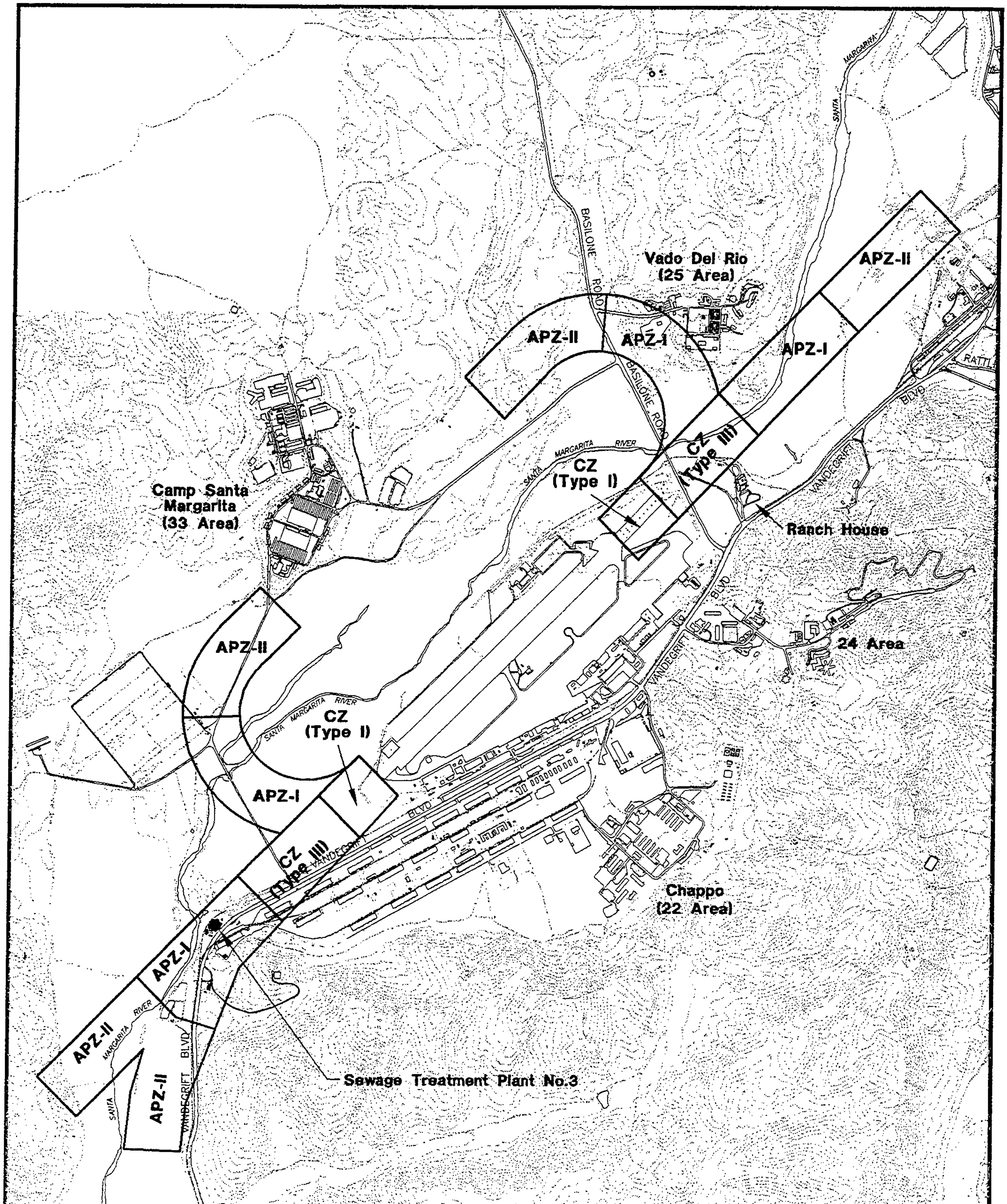
3.10.2 Airfield Safety

MCAS Camp Pendleton operates and maintains an airfield to support flight operations of tenant units and other units as assigned. Aircraft operations may be conducted within special use airspace above the air station, such as Military Operating Areas (MOAs) or Restricted Areas. Airspace operations and coordination with surrounding air facilities are conducted in accordance with Federal Aviation Administration (FAA) and Navy regulations. The MCAS Camp Pendleton Master Plan, AICUZ regulations, and Appendix E of the Facility Planning Factor Criteria for Navy and Marine Corps Shore Installations identify land use and height restrictions related to air operations safety.

Land use and height restrictions, related to air operations safety, are delineated by airfield imaginary surfaces. (See Section 3.4, Land Use) These surfaces consist of imaginary planes with specific starting and ending points on a particular slope, and include the Primary Surface, the Approach-Departure Clearance Surface, the Clear Zones, and the APZs (Figure 3.10-1).

The primary surface is a horizontal plane symmetrically centered on the runway at the established elevation of the landing surface. The area within the primary surface must be free of obstructions. MCAS Camp Pendleton runway is 6,000 feet long (1,828 meters) with an additional 1,000 feet (304.8 meters) paved overrun located on the west end of the runway.

The Approach-Departure Clearance Surface is an inclined imaginary surface which flares outward and upward above the runway centerline, beginning at the end of the Primary Surface and rising at 1 foot (0.30 meters) vertically for every 40 horizontal feet (12.2 horizontal meters) (i.e., 40:1). The area underneath this surface is referred to as the Approach-Departure Clearance Zone. The slope starts with a width of 1,000 feet (305 meters) and extends 50,000 feet (15,240 meters) with an end dimension of 16,000 feet (4,877 meters). The plane is conical in its horizontal projection and widens



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SCALE IN FEET

LEGEND

CZ	Clear Zone
APZ-I	Accident Potential Zone I
APZ-II	Accident Potential Zone II

MCAS Clear Zones and Accident Potential Zones

Figure 3.10-1

by 2 feet (0.6 meters) for every 7 feet (2.1 meters) beyond the end of the Clear Zone. The slope of the clearance surface is 40:1 until it reaches an elevation of 500 feet (152.4 meters) above the established airfield.

Accidental Potential Zones. The DoD established the AICUZ Program according to Navy Department OPNAVINST 11010.36A to effectively plan for land use compatibility in areas surrounding military air installations. The purposes of the AICUZ program are to minimize public exposure to potential safety hazards associated with aircraft operations, and to protect the operational capability of the air installations. In addition to building heights/obstruction criteria (discussed in Section 3.4, Land Use) and noise (discussed in Section 3.7, Noise), the AICUZ program includes analyses of airfield APZs (Department of the Navy, 1995a).

The purpose of defining APZs is to restrict surrounding land uses for the protection of persons and property on the ground. Rather than addressing the probability of accidents occurring, APZs define the areas that would most likely be affected if an accident were to occur. Three types of APZs are identified: the Clear Zones, APZ I and APZ II. The dimensions and applications of these zones are described below.

Clear Zone. The standard runway Clear Zone extends approximately 3,000 feet (914.4 meters) from the end of the runway and has the highest probability of being affected by accidents. For airfield safety reasons, the Clear Zone should have no obstructions. No buildings or structures may be present within the Clear Zone unless they have been approved and a waiver obtained from NAVAIRSYSCOM (Department of the Navy, 1993b).

The Clear Zone for a Class A runway has a length of 3,000 feet (914.4 meters) and a width of 1,000 feet (304.8 meters). Objects in this area cannot penetrate the Approach-Departure Clearance Surface. Restrictions on land uses in a Clear Zone vary. The Clear Zone for a Class A runway is divided into Type I and Type III Clear Zones. The Type I Clear Zone is a 1,000-foot-wide (304.8 meters) by 1,000-foot-long (304.8 meters) plane extending from both ends of the Primary Surface. The area must be clear, graded, and free of aboveground objects and must have special ground treatment or pavement in the area designated as the runway overrun. No objects or structures may be located in a Type I Clear Zone except airfield approach lighting provided that lighting is located and installed in the standard configuration. At MCAS Camp Pendleton, the north Type I Clear Zone is paved for the full length, but not for the full width of the Clear Zone. The existing temporary levee crosses the north corner of the north Type I Clear Zone. The south Type I Clear Zone is not paved.

Type III Clear Zones are 2,000 feet (609.6 meters) long, 1,000 feet (304.8 meters) wide, and adjacent to the Type I Clear Zone. Objects in this zone cannot penetrate the Approach-Departure Clearance

Surface. Trees, shrubs, bushes, or any other natural growth must be topped 10 feet (3.1 meters) below the Approach-Departure Clearance Surface or to a lesser height if necessary to ensure visibility of airfield lighting. Buildings for human habitation are not allowed in the Type III Clear Zone even if they would not penetrate the Approach-Departure Clearance Surface. Traverse ways (e.g., roads, railroads, and canals) are permitted provided they would not penetrate airfield imaginary surfaces. The existing Basilone Road alignment crosses the middle portion of the north Type III Clear Zone. A water well (Facility 2301) and portions of two general warehouse buildings (Facilities 2234 and 2235) are located within the south Type III Clear Zone.

APZ I. The potential for accidents decreases for APZ I, which extends 5,000 feet (1,524 meters) beyond the Clear Zone and is provided under flight paths which experience 5,000 or more annual operations. APZ I is a normally rectangular area lying beyond the Clear Zone. Typically, the APZ I is 3,000 feet (914.4 meters) wide by 5,000 feet (1,524 meters) long. It may also curve to accommodate the shape of the flight path.

APZ II. The restrictions on land uses decrease further under APZ II, which extends 7,000 feet beyond APZ II. APZ II is normally a rectangular area beyond APZ I which has a lower potential for accidents from APZ I. APZ II is normally present under a flight path whenever APZ I is required. Its dimensions are usually 5,000 feet (1,524 meters) wide by 7,000 feet (2,133.6 meters) long. It may also curve to follow the flight path.

As with the Clear Zones, certain land use restrictions are recommended in these high risk areas. No facilities at MCAS Camp Pendleton are located in north APZs I and II on the north side of the runway, but 11 facilities are located within the south APZ I, including a general warehouse (Facility 2230) and 10 facilities that comprise STP No. 3. Because STP 3 is not occupied, this does not represent a safety conflict. The warehouses are considered existing, nonconforming uses.

3.10.3 Explosives Safety

Munitions and explosives use at Navy and Marine Corps shore establishments is governed by regulations of the NAVSEASYSCOM. Among these regulations are Explosive Safety Quantity Distance (ESQD) standards established to govern the minimum allowable distance required to separate an explosives handling or storage operation (i.e., the potential explosive site [PES]) from other functions, such as public traffic routes and inhabited buildings (i.e., exposed sites). ESQD arcs surround each magazine and facility used for the storage or handling of ordinance. The distance that the ESQD arc extends from the magazine or facility is dependent upon the type and quantity of explosives authorized for storage or handling. ESQD arcs prohibit the placement of inhabited buildings within unsafe distances to ordinance storage facilities. Minimum separation distances for various types of exposed sites are a function of the type of explosives being handled or stored at the

PES, the type of facility or site where the explosives are being handled or stored (e.g., a storage igloo or loading area), and the type of exposed site structure or activity. For inhabited buildings, which includes structures or other places not directly related to explosive operations where people usually assemble or work, the minimum separation distance is generally 1,250 feet (381 meters) from the PES.

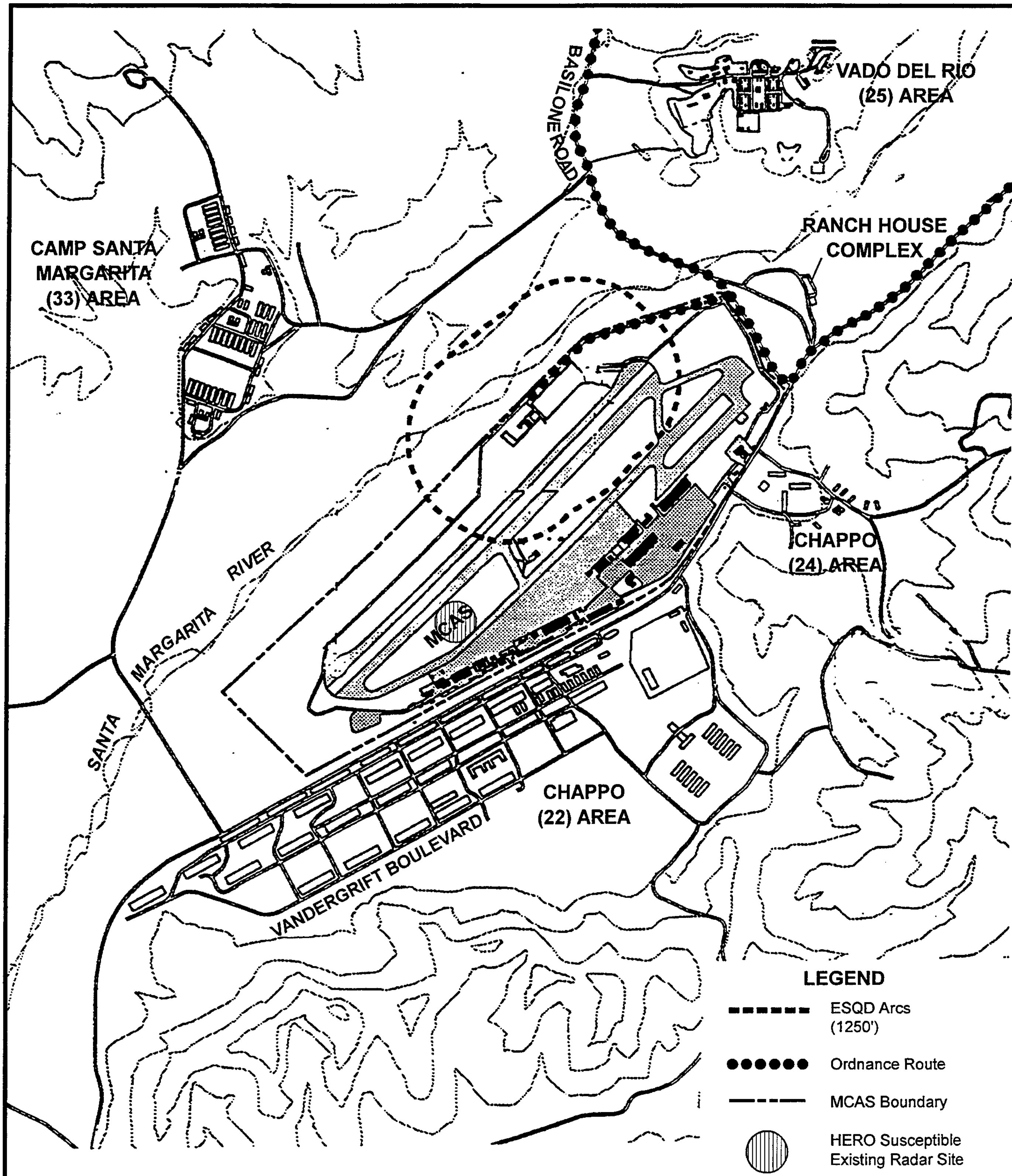
At MCAS Camp Pendleton, the Aircraft Loading Area, an explosives handling area located between the north side of the runway and the Santa Margarita River, is subject to these regulations. This facility is sited to accommodate up to 30,000 pounds net explosive weight (13,608 kilograms) of munitions or explosives. A 1,250-foot (381-meter) ESQD zone has been established around this facility (Figure 3.10-2). No inhabited buildings or structures can be located within this 1,250-foot (381 meters) radius zone (established from the corners of the loading area facility). Certain types of noninhabited facilities may be located within this ESQD zone, providing that they comply with the standards established in the NAVSEA OP-5 Vol 1 Ammunition and Explosives Ashore Safety Regulations for Handling, Storing, Production, Renovation, and Shipping. A portion of the existing levee is within the ESQD zone for this facility.

3.10.4 Hazardous Materials Contamination

Numerous federal, state, and local laws exist which regulate the storage, disposal, and transportation of hazardous materials and wastes. The primary goals of these laws is to protect public safety and environmental health. The cleanup of hazardous waste release sites is regulated under either the Installation Restoration Program (IRP) of the U.S. Marine Corps, or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, and the Superfund Amendments and Reauthorization Act (SARA) of 1986, or by the state (for sites that are contaminated with petroleum products [excluded under CERCLA]).

Pursuant to SARA, several areas of contamination at MCB Camp Pendleton in the project area are being evaluated and remediated under the Navy IRP. IRP Sites 4, 5, 6, 16, 17, 22, 25L, and 27 are within the project area and are described below.

Site 4 and 4A - MCAS Drainage Ditch and Concrete-lined Surface Impoundment. Site 4 consists of a drainage ditch that parallels MCAS Camp Pendleton. The drainage ditch begins at the northeastern end of MCAS Camp Pendleton and Vandegrift Boulevard and empties into the Santa Margarita River southwest of the air station, near STP No. 3. Site 4A consists of a concrete-lined surface impoundment within MCAS Camp Pendleton, near Building 2379. The surface impoundment measures approximately 50 feet by 250 feet (15.2 meters by 76.2 meters), and is used to catch runoff water from the adjacent aircraft hangars (IT Corporation, 1995). In December 1995,



Source: MCAS Camp Pendleton, Master Plan, 1989.

MCAS Explosive Safety Quantity Distance (ESQD) Arcs

Figure 3.10-2

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a Record of Decision (ROD) was signed with a determination that no further action was required for the soils at these sites. Effects on groundwater are being addressed in an area-wide study which includes IRP Sites 4, 6, 16, 17, and 27.

Site 5 - Firefighter Drill Field. Site 5 consists of a known burn pit and a suspected burn pit. An unlined circular pit was used for training firefighters from the late 1940s until 1981. The pit had a diameter of about 60 to 70 feet (18.3 to 21.3 meters) and was ringed by an approximately 1-foot (0.3 meters)-high earthen berm. After firefighter training burns were discontinued in early 1981, the pit was regraded. The suspected burn pit is approximately 1,500 feet (457.2 meters) southwest of the old burn pit. The area is covered by grass and shows no signs of surface contamination. This area is bordered to the northwest by the Papa taxiway and to the southwest by a parking area (IT Corporation, 1993). A Removal Action was conducted at this site in Fiscal Year (FY) 1995. No further action has been proposed for this site in the upcoming ROD for Operable Unit 2.

Site 6 - DRMO Scrap Yard and Building 2241. The Site 6 scrap yard is located in an unpaved area approximately 550 feet (167.6 meters) east of Vandegrift Boulevard. The scrap yard operated from the early 1950s until 1979 as a storage, processing, and disposal area for scrap metals, salvage items, hazardous materials, and polychlorinated biphenyl (PCB) transformer fluids. Building 2241, which currently serves as a warehouse, is located on a paved area immediately north of the scrap yard (IT Corporation, 1995). A Removal Action was completed for soils at this site in FY97 and no further action is recommended. Effects on groundwater will be addressed in an area-wide groundwater plume study.

Site 16 - 22 Area Buildings 22151 and 22187 Ditch Confluence and Ditch. Site 16 is located approximately 0.25 mile (0.4 kilometers) southeast of MCAS Camp Pendleton. This site received discharge from an oil/water separator that may have been working improperly. The ditch also received runoff from operations involving petroleum, oil, and lubricants (POL), and solvents. A diesel spill reportedly occurred in this area that may have affected this site and Site 17 (IT Corporation, 1995). No further action for soils and groundwater will be addressed by the 22/23 Area groundwater investigation study.

Site 17 - 22 Area Building 22187 Marsh and Ditch. Site 17 is located approximately 0.25 mile (0.4 kilometers) southeast of MCAS Camp Pendleton. The site is relatively flat and located in the floodplain. It receives drainage from several southwest-flowing ditches and runoff from the Building 22187 area. The confluence of several of the ditches widens and creates a marsh at this site. Both diesel fuel and corrosive descaler are currently stored at this site. Corrosives (descalers) and POL were used and stored in the Building 22187 area. A diesel spill at Site 16 reportedly flowed into the drainage ditch immediately north of Building 22187 (IT Corporation, 1995). No further action for soils and groundwater will be addressed by the 22/23 Area groundwater investigation study.

Site 22 - 23 Area Unlined Surface Impoundment. Site 22 consists of an unlined open-surface impoundment, which was constructed in 1980 to catch surface run-off from the hangar fire suppression system at MCAS Camp Pendleton. The surface impoundment was lined with a polyethylene sheet, which may have subsequently been damaged. In 1985, fuel bladders were reportedly stored in this impoundment. Potential contaminants contained in the surface impoundment include fuels, solvents, cleaners, and fire suppressant. No further action is proposed for this site.

Analytical results from sampling performed during 1990 indicate that sludge in this surface impoundment contained 68 ppm of total petroleum hydrocarbons (TPH), 0.008 ppm of chloroform, 7.3 ppm of acetone, and total dissolved solids (TDS) concentration of 1,150 ppm. A Draft Final RI dated March 17, 1995 stated that further investigation was necessary, and remedial action is continuing at the site.

Site 25L - Santa Margarita River Basin Surface Water and Sediment. Site 25 encompasses basewide surface water and sediment. This area is further divided into sample locations 25J to 25N from upstream to downstream. Site 25L is located approximately 500 feet (152.4 meters) east of the intersection of Basilone Road Bridge and the Santa Margarita River. No further action is proposed for this site.

Site 27 - 22 Area Ditches Behind Building 22210. Site 27 is located approximately 0.25 mile (0.4 kilometers) southeast of MCAS Camp Pendleton. This site contains unlined drainage ditches that received runoff from various maintenance facilities and hazardous material transfer and storage lots in the Chappo 22 Area (IT Corporation, 1995).

3.11 ENVIRONMENTAL JUSTICE

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, states that "to the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low income populations..." Executive Order 12898 was adopted on February 11, 1994. The Executive Order and its accompanying separate memorandum provide direction to federal agencies to focus attention on environmental and human health conditions in minority and low income communities. The requirements of Executive Order 12898 ensure that identified impacts are not disproportionately affecting minority and low-income populations.

The proposed flood control project and Basilone Road Bridge Replacement would be located on MCB Camp Pendleton. The nearest offbase populated areas are approximately 5 miles (8.04 kilometers) from the project area. These areas include the City of San Clemente to the north (population 41,100), the City of Oceanside to the south (population 128,398), and the unincorporated community of Fallbrook to the east (population 22,095).

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4.0 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

4.0 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

A summary comparison of the potential impacts that may be associated with the Proposed Action and the No Action Alternative along with the required mitigation measures for the Santa Margarita River Flood Control Project (P-010) and for the Basilone Road Bridge Replacement Project (P-030) is presented in Figure 4.0-1.

Under flood conditions similar to those experienced in 1993, the No Action Alternative would result in potential significant adverse impacts for Hydrology (surface water, water quality), Traffic (Basilone Bridge failure), Cultural Resources (Ranch House complex damage), and Safety and Environmental Health (Sewage Treatment Plant [STP] 3, drinking water wells, access to emergency services).

All of the project alternatives could result in potential significant impacts to Biological Resources, with the least direct and indirect impacts on biological habitats occurring with Alternative 3A.

All of the project alternatives could result in potential significant impacts on Cultural Resources that would be mitigated below a level of significance through appropriate data recovery.

Significant Aesthetic and Visual Impacts could occur for project alternatives that include Levee Alignment 1 or Bridge Alignment C due to structural intrusions adjacent to the Ranch House Complex.

4.1 GEOLOGY, SEISMICITY, AND SOILS

4.1.1 Criteria for Significance Determination

For the purpose of this analysis, impacts are considered significant if proposed project alternatives cause serious adverse effects to the local geologic features or soils, or if conditions imposed by the local geology, soils, or seismicity would potentially be hazardous by causing damage to, or failure of, structures constructed as part of the proposed project.

RESOURCE / ALTERNATIVE	No Action Alternative			Alternative 3A			Alternative 3B			Alternative 3C			Alternative 1A			Alternative 1B			Alternative 1C			Alternative 2A			Alternative 2B			Alternative 2C		
	Existing Levee System	Existing Stormwater Management System	Existing Bridge	Levee Alignment 3	Current Detainment Area	Bridge Alignment A	Levee Alignment 3	Current Detainment Area	Bridge Alignment B	Levee Alignment 3	Current Detainment Area	Bridge Alignment C	Levee Alignment 1	Current and West Detainment Areas	Bridge Alignment A	Levee Alignment 1	Current and West Detainment Areas	Bridge Alignment B	Levee Alignment 1	Current and West Detainment Areas	Bridge Alignment C	Levee Alignment 2	Current and West Detainment Areas	Bridge Alignment A	Levee Alignment 2	Current and West Detainment Areas	Bridge Alignment B	Levee Alignment 2	Current and West Detainment Areas	Bridge Alignment C
Geology, Seismicity, Soils	●	●																												
Hydrology and Water Quality																														
Surface Water	●	●	●																											
Water Quality																														
Biological Resources																														
Habitats				●		●	●		●	●		●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●
Sensitive Species				●		●	●		●	●		●	●		●	●		●	●		●	●		●	●		●	●		●
Wetlands				●			●			●		●	●			●	●		●		●	●			●			●		●
Land Use				○		○	○			○			○		○	○			○			○		○	○			○		
Traffic			●																											
Noise																														
Air Quality																														
Cultural Resources																														
Prehistoric Resources				○		○	○		○	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Native American Resources				○		○	○		○	○		○	○		○	○		○	○		○	○		○	○		○	○		○
Historic Resources		●		○		○	○		○	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Aesthetics and Visual Resources												●	●			●			●		●									●
Safety and Environmental Health	●	●				○									○									○						
Environmental Justice																														

No significant impacts
○ Mitigated significant impacts
● Unavoidable adverse impacts

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Figure 4.0-1 Summary of Potential Significant Environmental Impacts - Santa Margarita River Flood Control Project,

4.1.2 Impact Analysis

4.1.2.1 Alternative 3A [Levee Alignment 3 + Bridge Alignment A]-Preferred Alternative

Levee Alignment 3. Levee Alignment 3 would be designed and constructed to reduce potential effects on sediment movement and the geomorphology of the stream valley. To minimize soil disturbance during construction, erosion control measures would be implemented in all areas as necessary, using standard accepted practices. In addition to erosion control mitigation measures during construction, the levee is designed to ensure the continuance of the present equilibrium of the river system and the structural integrity of the levee itself. Based on the analysis provided by Northwest Hydraulic Consultants (1997), this alternative would cause the least amount of sediment increase through the project reach. For this alternative, the Basilone Road area and STP No. 3 would have an increase in scour, caused by abrupt changes in flow during a storm event (Northwest Hydraulic Consultants, 1997).

The fluvial processes in the Santa Margarita River, the dynamics of the channel, and the long-term equilibrium of the floodplain geomorphology would not be significantly affected by the levee alignments. Sedimentation processes in the Santa Margarita River have been studied (Northwest Hydraulic Consultants, 1997) and subsequent modeling of sediment erosion and deposition has been conducted using the Corps of Engineers HEC-6 model. Analysis of historic channel plan form and invert (the deepest point of the channel cross section) trends indicates that the main channel of the river has migrated within a relatively stable corridor of approximately 2,000 feet in width, and the invert has moved up and down within a 10-foot elevation band. This process is expected to continue and be essentially unaffected by the addition of a levee. There will be, by design, localized changes in sedimentation near the bridge and in other locations where minor constriction of flow would occur following construction. Erosion processes may be slightly accelerated until a new dynamic equilibrium is achieved.

For this levee alignment, the impact on the channel would be negligible. The configuration of the levee would not encroach upon the present channel except for a short distance near the south end of the airfield. The channel in this case would be moved laterally (west) slightly, and placed so that the alignment matched the existing channel to the maximum extent possible. Repositioning the channel would be accomplished to maintain the present flow gradient. The new channel segment would be constructed to maintain the same depth and width as the present channel.

To maintain the river's present course, a guide vane would be constructed east of the Ranch House complex, parallel to the river, to guide the river. Behind the vane, another end segment of the levee would protect the Ranch House area (see Figure 2.3-1). Some long-term sedimentation may occur

between the guide vane and the end segment of the levee. However, this process would not be expected to begin until the first major flood event inundates the area behind the vane.

A reinforced concrete flood wall would be constructed between the existing earthen channel adjacent to Vandegrift Boulevard and the existing railroad grade. The arrangement and extent of this structure is shown in Figure 2.3-3. It would be approximately 2,300 feet long. The limits of construction would be from the top of the outside edge of the earth channel to a maximum of about 55 feet from the outside face of the wall. The existing earth channel would be protected from virtually all temporary and permanent impacts. The impacts to the area outboard of the flood wall would be minimized by locating the flood wall as close as possible to the earthen channel.

The windrow revetment would be placed in the outboard excavation. The revetment would extend from 6 feet minimum (approximately from the upstream junction with the levee to Rifle Range Road) to 45 feet maximum (from Rifle Range Road to the downstream junction with the levee). The revetment would be covered with about 2 feet of earth, which, along with the wall backfill, would be revegetated with a native grass mix.

The change in direction of the levee near the south end where the floodwall would be built would allow riparian habitat and potential wetland areas to remain outside the levee and within the undisturbed portion of the floodplain. The configuration of this levee segment would cause a low-energy zone to exist during floods. This will require a concrete floodwall that is capable of withstanding the forces of a flooding event to be constructed in this segment of the levee (see Figure 2.3-1).

The National Resource Conservation Service (NRCS) has identified soils located within the impacted area that have the potential for containing hydric inclusions. Hydric soils are an environmental component that are required to define a jurisdictional wetlands. The proposed alternative has the potential for negative impacts to possible hydric soils that may be associated with a jurisdictional wetland.

Conditions which could potentially impact the integrity of the levee would be mitigated through proper design and construction. This would include construction of a compacted earth embankment reinforced with suitable protection such as geogrids on the dry side, and reinforced with an 8-foot-thick soil cement revetment on the river side. The base of the levee would be embedded a minimum of 1 meter (3 feet) into the foundation soils and reinforced along the entire base with geogrids. The river side would be protected to a depth of 2 meters by soil cement to prevent undermining and scouring. Excavated soil would be stockpiled for use elsewhere. Seepage control on the dry side would be achieved with construction of a berm with an underlying subdrain (Kleinfelder, 1997).

The fill material for construction of the levee would be supplied primarily from two borrow sites located on the base. As each borrow site is greater than 5 acres in size, a review of the current National Pollution discharge Elimination System (NPDES) permit for sedimentation would be required prior to construction. They are designated as the Chappo (22) Area and East Oscar borrow sites (see Figure 2.3-1). For this alternative, only the borrow site at Chappo (22) Area would be used. The potential impacts include grading, erosion, and siltation; loss of vegetation, topsoil and seedbank; plus the removal of the geologic material. The Chappo (22) Area site is already disturbed due to previous borrow activities. The borrow site would be graded to a new elevation to generate the required fill material. Erosion control during construction would be implemented using best management practices. Final grading would achieve a slope less than 15 percent to prevent erosion. Stockpile top soil would be replaced along with replanting of the native vegetation after completion of the borrow activities.

A large seismic event could result in the liquefaction and dynamic settlement of the alluvium underlying the river channel. However, soil borings indicate that there are only a few thin, discontinuous zones susceptible to liquefaction in the project area. Were liquefaction to occur after a seismic event, there could be some settlement of the levee; however, the serviceability of the levee should not be impacted. The levee would be maintained on a continuing basis, and any slumping or settlement resulting from a seismic event would be repaired.

No significant geologic, soil, or seismic impacts would be expected with implementation of the Levee Alignment 3. The current stable conditions of the geological and soil aspects of the area would be maintained through acceptable design and construction of the levee and its associated structures.

Stormwater Management System. The pump station and associated stormwater entry channels would be built on soils that have been previously disturbed by construction of STP No. 3. In addition, the pump station would be built within the construction corridor of the proposed levee because the pump station would have to be integrated into the levee structure. Therefore, the impacts from soil disturbance due to construction of the pump station would not be much greater than those for construction of Levee Alignment 3. The pump station would add less than 1 acre of permanent disturbance to the entire levee structure. Any impacts due to soil erosion would be addressed through proper design of the pump station and the levee, and through the use of the standard construction control practices during the construction period. The stormwater management system for Levee Alignment 3 would utilize an existing temporary inundation area, existing culverts, and existing concrete and earthen ditches. Therefore, no additional soil disturbance would occur.

Although general acceleration would be experienced during an earthquake, standard building codes used in the design would prevent any seismic impacts. Therefore, there would be no geologic, seismic, or soils impacts from construction of the stormwater management system.

Bridge Alignment A - Existing Alignment. Removal and replacement of Basilone Road Bridge would allow the river to return to a normal flow pattern. This would cause localized change in sedimentation, that have been evaluated in the NHC report (1997) as minor in overall effect. The proposed new bridge would be sited approximately in the same location as the existing bridge (see Figure 2.3-1). Therefore, this alignment would have the least impact on soils from ground disturbance activities. The foundation for the bridge would span the river channel that is underlain by alluvial deposits, which may have the potential for settlement and liquefaction. In addition, the roadway approaches would require the placement of imported fill material which would have the potential for settlement and erosion. Conditions which could affect the integrity of the bridge and the roadway approaches would be mitigated through proper design and construction; stabilization of roadway approach embankments and placement of pylons in the bridge construction would prevent any significant impacts from geologic conditions. During the construction of the bridge, Rifle Range Road would be temporarily reestablished as the north-south access in this area. Potential impacts could occur to soils with possible hydric inclusions associated with wetlands from the reestablishment of this road.

Potential impacts to soils, with possible hydric inclusions associated with wetlands, from construction of the bridge and roadway, would be the same as for Levee Alignment 3A.

4.1.2.2 Alternative 3B [Levee Alignment 3 + Bridge Alignment B]

Levee Alignment 3. Geologic, soil, or seismic impacts would be the same as those described for Levee Alignment 3 of Alternative 3A.

Bridge Alignment B - East Curve Alignment. Geologic, soil, seismic impacts from the East Curve Alignment would be the same as those described for Bridge Alignment A. The East Curve Alignment of the proposed bridge would result in slightly longer roadway approaches than Bridge Alignment A (see Figure 2.3-6). This would require additional fill material to be placed within an area previously undisturbed by a roadway, result in potentially greater impacts to soils. However, the bridge and roadway approaches would be constructed in the same manner as Bridge Alignment A. Therefore, impacts from the East Curve Alignment would be similar to Bridge Alignment A. Impacts from geologic conditions and soil erosion would be mitigated through design and standard construction practices; therefore, there would not be any significant impacts to geological resources.

4.1.2.3 Alternative 3C [Levee Alignment 3 + Bridge Alignment C]

Levee Alignment 3. Impacts to geology, seismicity, and soils would be the same as those described for Levee Alignment 3 of Alternative 3A.

Bridge Alignment C - Rattlesnake Canyon Alignment. The impacts of Bridge Alignment C would be greater than either of the other two bridge alignments due to a much longer bridge and roadway approach that is located in a completely different alignment upstream of the Ranch House complex (Figure 2.3-7). Bridge Alignment C would create a new roadway and bridge corridor across the river resulting in a greater potential soil disturbance. Placement of 16 bents in the river would disturb more alluvial soils. In addition, construction of the roadway approach on the north side of the river would require grading on any hillside slopes greater than 15 percent. The roadway cuts and grading would expose hillside surfaces to erosion. However, the hard granitic bedrock underlying the soils would tend to inhibit significant erosion with proper stabilization of cuts and fills through proper design and standard construction practices. Grade alternatives where the bridge would intersect Vandegrift Boulevard would not result in a significant impact to soils already disturbed by Vandegrift Boulevard.

Potential impacts to soils, with possible hydric inclusions associated with wetlands, from construction of the bridge and roadway, would be the same as for Levee Alignment 3A.

4.1.2.4 Alternative 1A [Levee Alignment 1 + Bridge Alignment A]

Levee Alignment 1. Levee Alignment 1 has the potential for negative impacts to possible hydric soils that may be associated with a jurisdictional wetland.

Seismic conditions would be the same as for Alternative 3A, and no significant geologic, soil, or seismic impacts would be associated with Levee Alignment 1.

Like Alternative 3A, this levee alignment would be designed and constructed to reduce potential effects on sediment movement and the geomorphology of the stream valley. To minimize soil disturbance during construction, erosion control measures would be implemented in all areas as necessary, using standard accepted practices. In addition to erosion control mitigation measures during construction, the levee is designed to ensure the continuance of the present equilibrium of the river system and the structural integrity of the levee itself. In addition, this alternative includes three river training structures (spur dikes with silt fences), located upstream of the east end of the proposed levee. Northwestern Hydraulic Consultants (1997) has estimated that this alternative could allow an increase in sediments within the project reach and that the depth of scour would be relatively consistent with an increase observed at the toe down position of the levee.

For this alternative, both the Chappo (22) Area borrow site as well as the East Oscar borrow site would be used. Access to the East Oscar borrow site would be by Rifle Range Road, which would be temporarily established to support construction traffic, limited residential access, and emergency vehicles.

Some localized channel changes would occur, but these changes are not expected to have any significant impact on the long-term channel processes. For this alternative, the configuration of the levee would encroach on the present channel at two locations: near the Basilone Road Bridge and along the southwest edge of the airfield. In these areas, the channel invert would be moved laterally away from the levee, and aligned to match the existing channel to the extent possible. Repositioning the channel would be accomplished in such a manner as to maintain the present flow gradient. There would be a negligible change in the stream invert elevation over the relatively short lengths of the channel segments to be moved, because the lengths would remain virtually the same. The new channel segments would be constructed to maintain the same depth and width as the present channel.

In the area were the channel changes occur, flow velocities would temporarily increase and the presence of the levee could increase the potential for erosion of alluvial material. Eventually, a new dynamic equilibrium flow regime would be established, flow velocites would return to pre-project levels, and erosion processes would decrease.

Cutting back the slope along the north side of the river channel at a point across the river west of the Santa Margarita Ranch House complex would guide the stream flow to reduce the impact of repositioning the channel and maintain the current stability of the river. This cut would expose granitic bedrock, and because of the hardness and consolidation of this rock, excavation of this slope would likely be somewhat more difficult than excavation elsewhere. However, because of the nature of the rock, the slope would not be subjected to significant erosion and would likely remain stable. If any conditions indicative of slope instability are observed during excavation of this slope, appropriate recommendations from a qualified geotechnical consultant should be provided.

Levee Alignment 1 would include placement of three river training structures (spur dikes with silt curtains) in the river plain, located upstream of the east end of the proposed levee. The training structures would be comprised of a combination of an earthen spur dike and a silt fence. Construction of the earthen dike portion of the training structure would result in permanent disturbance of soils within the river. Implementing standard construction practices would prevent significant erosion. These training structures tend to direct surface water flows away from the structures itself, and therefore, reduce potential erosion around the training structure. Normal sedimentation and erosion associated with these training structures during various flood conditions are described further in Section 3.2.

Conditions which could potentially impact the integrity of the levee would be mitigated through proper design and construction as discussed for Alternative 3A.

Stormwater Management System. The Stormwater Management System for Levee Alignment 1 would be similar to that described for Levee Alignment 3 (Section 4.1.2.1). However, Levee

Alignment 1 would allow temporary inundation of an area west of MCAS Camp Pendleton (Figure 2.3-8). As with the Stormwater Management System detailed for Levee Alignment 1, there would be no additional impacts to soil disturbances by the Stormwater Management System proposed for Levee Alignment 1 beyond those accounted for during the construction of the floodwall.

Bridge Alignment A - Existing Alignment. Impacts to geology, seismicity and soils for Bridge Alignment A would be the same as those described for Alternative 3A.

4.1.2.5 Alternative 1B [Levee Alignment 1 + Bridge Alignment B]

Levee Alignment 2. Impacts to geology, seismicity, and soils would be the same as those described above for Alternative 1A.

Bridge Alignment B - East Curve Alignment. Impacts to geology, seismicity, and soils for Bridge Alignment B would be the same as those described for Alternative 3B.

4.1.2.6 Alternative 1C [Levee Alignment 1 + Bridge Alignment C]

Levee Alignment 1. Impacts to geology, seismicity, and soils would be the same as those described above for Alternative 1A.

Bridge Alignment C - Rattlesnake Canyon Alignment. Impacts to geology, seismicity, and soils for Bridge Alignment C would be the same as those described for Alternative 3C.

4.1.2.7 Alternative 2A [Levee Alignment 2 + Bridge Alignment A]

Levee Alignment 2. Levee Alignment 2 has the potential for negative impacts to possible hydric soils that may be associated with a jurisdictional wetland.

Seismic conditions would be the same as for Alternative 3A, and no significant geologic, soil, or seismic impacts that could not be mitigated would be associated with Levee Alignment 2.

Like Alternative 1A, this levee alignment would be designed and constructed to reduce potential effects on sediment movement and the geomorphology of the stream valley. To minimize soil disturbance during construction, erosion control measures would be implemented in all areas as necessary, using standard accepted practices. In addition to erosion control mitigation measures during construction, the levee is designed to ensure the continuance of the present equilibrium of the river system and the structural integrity of the levee itself. In addition, this alternative includes six

river training structures (spur dikes with silt fences), located upstream of the east end of the proposed levee. Northwest Hydraulic Consultants (1997) has estimated that this alternative could allow an increase in sediment within the project reach and that the depth of scour would be relatively consistent with an increase observed at the toe down position of the levee.

The six spur dikes with associated silt fences would be constructed along the west side of the river channel north of the north end of the levee. Spur dikes and silt fences would be engineered to maintain the river channel and floodplain in a stable, non-degradational condition.

Conditions which could potentially impact the integrity of the levee would be mitigated through proper design and construction as discussed for Alternative 3A. For this alternative, only the borrow site at Chappo (22) Area would be used.

Stormwater Management System. Impacts to geology, seismicity, and soils would be the same as those described for the Stormwater Management System under Alternative 1A because the same basic stormwater system configuration would be used.

Bridge Alignment A - Existing Alignment. Impacts to geology, seismicity, and soils for Bridge Alignment A would be the same as those described for Alternative 3A.

4.1.2.8 Alternative 2B [Levee Alignment 2 + Bridge Alignment B]

Levee Alignment 2. Impacts to geology, seismicity, and soils for Levee Alignment 2 would be the same as those described for Alternative 1A.

Bridge Alignment B - East Curve Alignment. Impacts to geology, seismicity, and soils for Bridge Alignment B would be the same as those described for Alternative 3B.

4.1.2.9 Alternative 2C [Levee Alignment 2 + Bridge Alignment C]

Levee Alignment 2. Impacts to geology, seismicity, and soils for Levee Alignment 2 would be the same as those described for Alternative 2A.

Subsurface geology and soils would not be adversely affected by construction of the pump station. Potential impacts to the structure caused by geological, soil, or groundwater conditions could include lateral "at rest" earth pressure, hydrostatic pressures below the water table (drainage would not be provided), and dynamic lateral pressures resulting from dynamic seismic loading.

Bridge Alignment C - Rattlesnake Canyon Alignment. Impacts to geology, seismicity, and soils for Bridge Alignment C would be the same as those described for Alternative 3C.

4.1.2.10 No Action Alternative

The No Action Alternative would not affect geology, soils, or seismicity. The existing levee would remain in place and no spur dikes or silt fences would be built. The current conditions of stability would remain unchanged, but the potential for damage resulting from a 100-year flood would continue to exist.

4.1.3 Analysis of Significance

No significant impacts to geology would occur; nor would there be significant impacts on the project structures caused by geologic, soil, or seismic conditions. The current stable conditions of the geologic and soil aspects of the area would be maintained through acceptable design and construction of the levee and its associated structures. It is possible that hydric soils associated with jurisdictional wetland environments may be significantly impacted.

4.1.4 Mitigation Measures

There would be no significant impacts to geology nor significant impacts on the project structures caused by geologic, soil, or seismic conditions. Possible impacts to hydric soils would be considered based on the presence of any jurisdictional wetlands located in the project area. Therefore, no mitigation measures would be required beyond those already incorporated into the project design or by standard practice as described in the impact analysis above.

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4.2 HYDROLOGY AND WATER QUALITY

4.2.1 Criteria for Significance Determination

For the purpose of this analysis, impacts are considered significant if hydrologic or hydraulic conditions or flooding potential would be adversely impacted by the proposed project alternatives. Such impacts would include increasing the areas of potential inundation from a 100-year flood or a flood of lesser magnitude, either in the immediate vicinity of the project area or upstream or downstream. In addition, impacts could be significant if the project resulted in unacceptable flow conditions which could potentially cause an increase in erosion or excessive sedimentation.

4.2.2 Hydrology and Flooding Potential Impact Analysis

All alternatives with the exception of the No Action Alternative would have the beneficial effect of providing 100 year flood protection at MCAS Camp Pendleton and portions of MCB Camp Pendleton. No significant adverse impacts to hydrology or channel hydraulics have been identified.

The ACOE's HEC-2 computer model was utilized to predict water surface elevation under a range of flow and channel roughness conditions. HEC-2 assumes there are no changes to the river bed geometry (fixed bed) and it does not predict sediment transport characteristics. The ACOE's HEC-6 computer model builds on the HEC-2 model and adds mobile boundary and sediment transport capabilities to the model. In combination, the two numerical models predict water surface elevation, quantify potential bed and sediment transport changes and describe the effects of project components on the overall hydrogeomorphic characteristics such as sediment transport, growth of in channel vegetation and morphology of the river system. The models were run on a river reach that extended from the confluence of the Santa Margarita River and De Luz Creek to the Pacific Ocean.

Any alternative, with the exception of the No Action Alternative, has been evaluated by Northwest Hydraulic Consultants (1997) as having the potential for only minor effects on the general erosion and sedimentation process expected along the area of the Santa Margarita River which would be affected by the proposed project. The model used in their report indicated that the alternatives, with the exception of the No Action Alternative, would have only slight and predominately local impacts on the aggradation and degradation trends of the channel with little or no effect on reaches upstream and downstream from the primary project area (Northwest Hydraulic Consultants, 1997). The majority of the anticipated aggradation and degradation changes associated with the alternatives may be attributed to the removal of the existing constriction associated with the current configuration of Basilone Bridge.

4.2.2.1 Alternative 3A [Levee Alignment 3 + Bridge Alignment A] Preferred Alternative

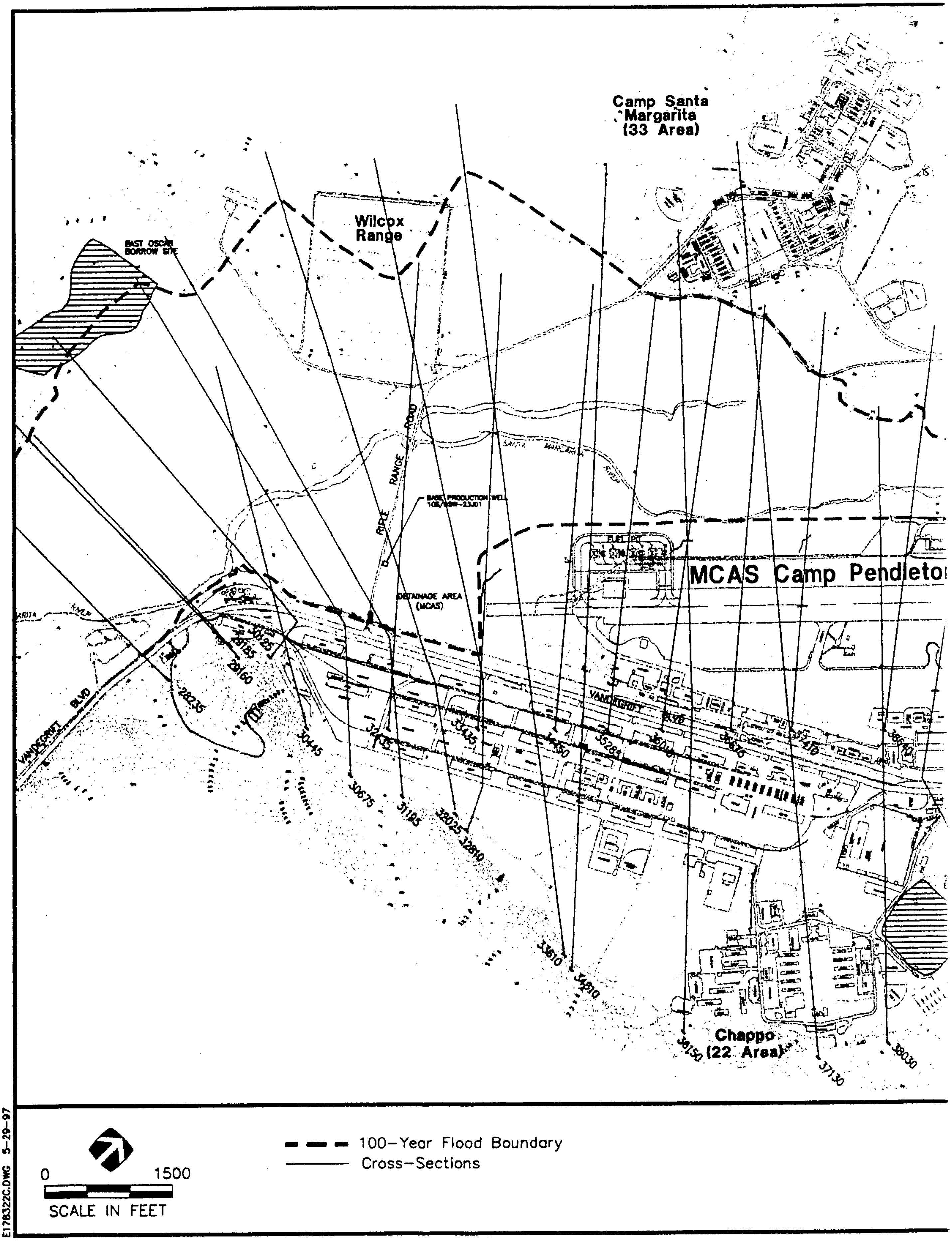
Levee Alignment 3. During site clearing and construction of the proposed levee and bridge, there would be some temporary disturbance of the river channel which could lead to local changes in low flow patterns. Neither clearing nor construction would occur during storm conditions. Since flows exceed 300 cfs only about 7 days per year, it is expected that most clearing and construction activities would occur in the dry areas surrounding the low flow channel. However, some realignment of the low flow channel would occur during levee construction, and channel diversions would occur during bridge construction. These minor changes to low flow conditions would not result in any significant impacts to overall flow of the river.

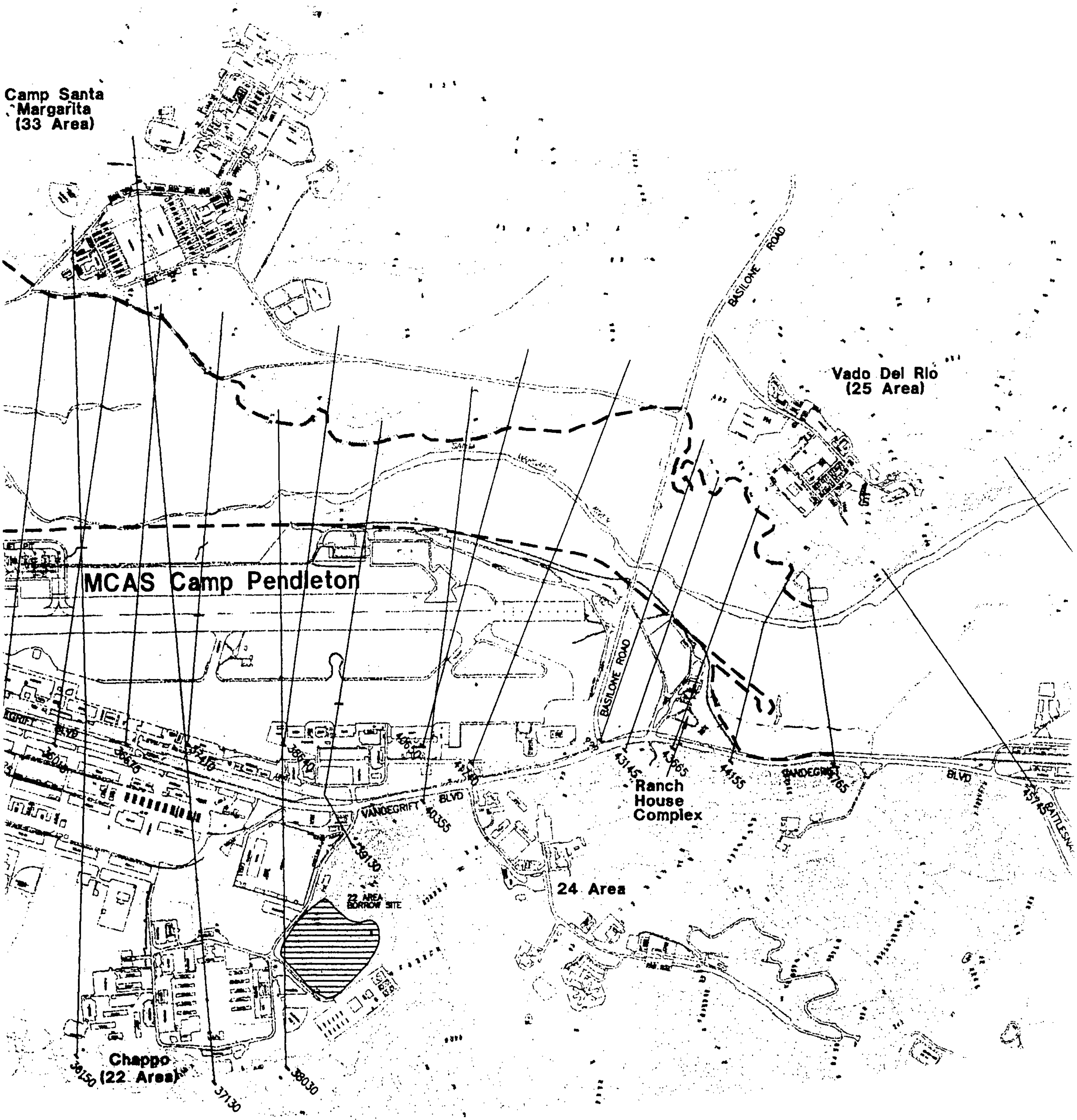
Once the levee is in place, the boundary of the 100-year flood event would not encroach onto MCAS Camp Pendleton although Base production well 10S/05W-23J01 would require replacement with an elevated wellhead access box for flood protection. Minor increases in the 100-year flood elevation would occur in the narrowest part of the flood zone immediately adjacent to the new levee. These minor changes would not have any adverse impacts to adjacent property, and no structures would be affected. The results of preliminary hydraulic modeling of the 100-year flood using the Corps of Engineers HEC-2 model are illustrated in Figure 4.2-1. The model indicates that the maximum increase in the 100-year flood level would occur at cross section 37410 where the 100-year flood elevation would increase from 72.2 feet above mean sea level for existing conditions to 73.0 feet, a change of less than 1 foot.

At cross section 37410, the flow velocity in the main channel would increase from 14.8 feet per second to 17.6 feet per second. This effect would likely cause some higher than normal scour of alluvial material at this location during the 100-year flood event. However, after a few large storm events, some channel morphology changes would occur until the sediment regime adjusted to a new equilibrium condition. This process is part of the natural dynamics of an alluvial channel in an arid environment such as that in Southern California.

Project effects associated with floods smaller than the 100-year flood would be much less than for the 100-year event. For example, at cross section 37410, the elevation of the 10-year flood is only 0.4 foot higher than for the existing condition, and there is no change in the elevation of the 2-year flood.

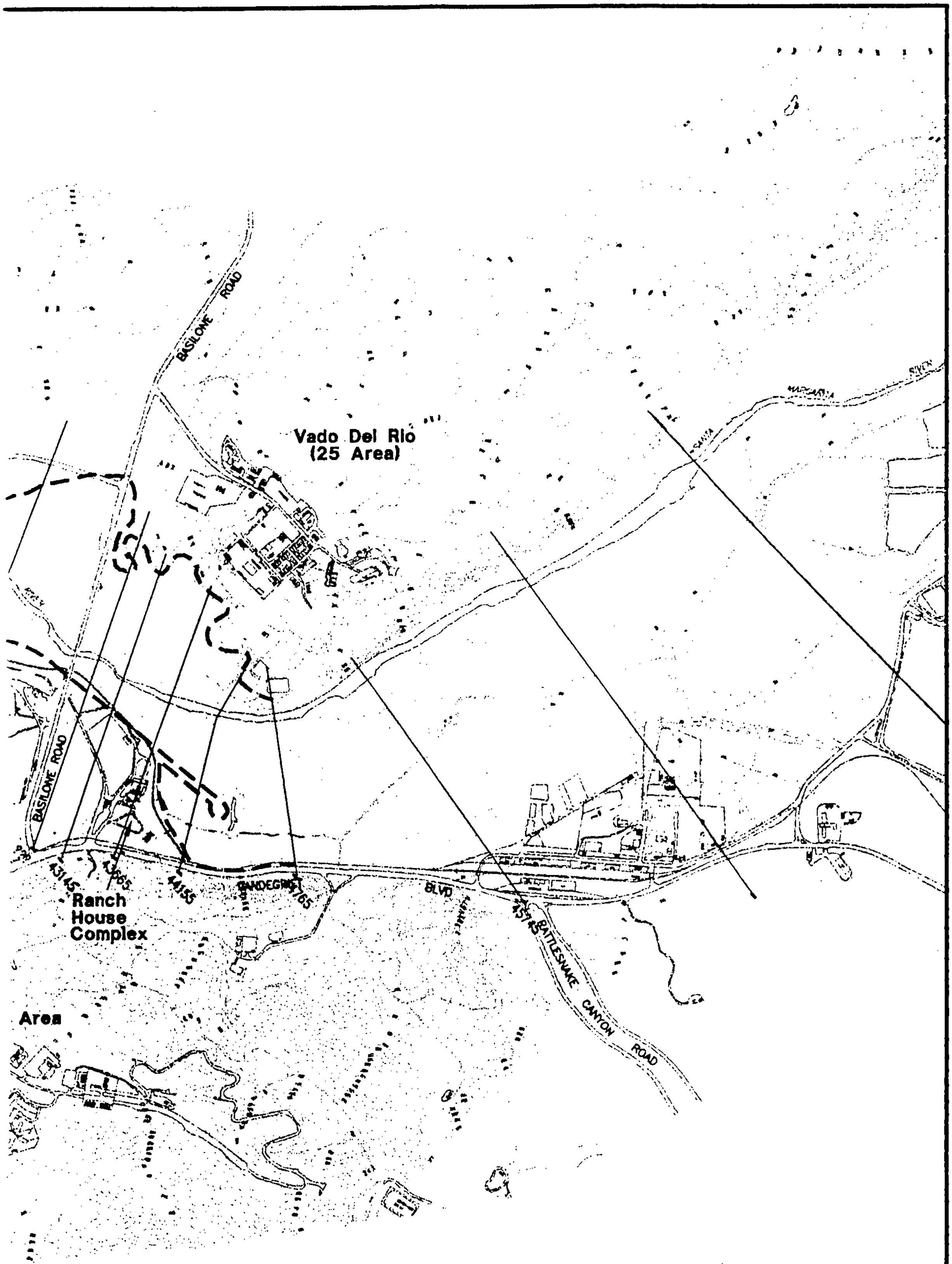
Because of the backwater effect in river hydraulics, changes in flow conditions normally occur only upstream of a structural change in a channel. Therefore, the project would not have any affects on the flow conditions downstream of the levee. Upstream of the project, the flow levels


Camp Santa Margarita (33 Area)
Wilcox Range
EAST OSCAR BORROW SITE
RIFLE RANGE ROAD
BASE PRODUCTION WELL
DETAINAGE AREA (MCAS)
MCAS Camp Pendleto
VANDEGRIFT BLVD
Chappo (22 Area)
28235
29160
30445
30675
31195
32025
32810
33610
34810
36150
37130
38030
100-Year Flood Boundary
Cross-Sections
0
1500
SCALE IN FEET
E178322C.DWG 5-29-97



Camp Santa Margarita (33 Area)
Vado Del Rio (25 Area)
BASILONE ROAD
MCAS Camp Pendleton
BASILONE ROAD
VANDEGRIFT BLVD
36670
38640
40355
43145
43665
44155
BLVD
Ranch House Complex
22 AREA BORROW SITE
24 Area
Chappo (22 Area)
38150
37130
38030

(2)



100-Year Flood Inundation
Levee Alignment 3

Figure 4.2-1

would be reduced by the removal of the constriction associated with the temporary bridge. This effect would decrease in the upstream direction to a point about 2,000 feet upstream of the levee where no project effects can be seen.

The proposed guide vane associated with Levee Alignment 3 will confine the effective flow path of the primary river flows to the north side of the flood plain in the immediate vicinity of the Ranch House complex bend. The area behind the guide vane (between the guide vane and the levee) will continue to get wet during the infrequent flood events that are of sufficient magnitude to overflow the main channel banks. The frequency and duration of inundation of the area behind the guide vane should remain approximately the same as today. During high flow events, the sheltered area may be expected to fill with water to elevations approximately equal to the level of the water in the main channel. This filling of sheltered area will limit the local circulation of flow and discourage the inflow of bed material sediments, and will result in a local bump or aggradation zone in the upstream shadow of the guide vane (Northwest Hydraulic Consultants, 1997).

Some deposition of suspended coarse material may be expected within the sheltered area as this condition develops, but in the long term the deposition will be limited to the relatively small volume of wash load material (silts and clays) that are carried by the initial flows into the sheltered area. The water that is captured within the sheltered area will gradually recede as flood levels in the adjacent channel recede, via the drain pipes that are to be constructed through the guide vane. Evapotranspiration by the riparian vegetation and normal infiltration processes will also assist in drainage of the area (Northwest Hydraulic Consultants, 1997).

For this alternative, only the Chappo (22) Area borrow site would be used. As indicated in Section 4.1.2.1, the NPDES permit would require review as the borrow site would be larger than 5 acres.

Stormwater Management System. The Stormwater Management System for Levee Alignment 3 would utilize an existing temporary inundation area located behind the Chappo (22) Area. This temporary inundation area would continue to collect and detain runoff from approximately one-half of the drainage basin. Collected stormwater would flow through existing culverts under Vandegrift Boulevard to a pump station that would be located near STP No. 3. Runoff from the remainder of the drainage basin would flow through the existing concrete drainage ditch that runs along the MCAS Camp Pendleton boundary, to an existing earthen ditch, to the proposed storm water pump station. The pump station would be designed to pump a peak flow of 1,000 cfs.

Bridge Alignment A - Existing Alignment. The 100-year flood level immediately upstream of the Basilone Road Bridge would decrease by about 4 feet in comparison to the flood level upstream of the existing temporary bridge. This effect is the result of the removal of the constriction imposed by

the current conditions. The flow velocity at this location would be reduced from 15.1 feet per second to 10.3 feet per second. This would reduce a potential scour problem associated with the current temporary bridge structure.

4.2.2.2 Alternative 3B [Levee Alignment 3 + Bridge Alignment B]

Levee Alignment 3. Impacts to hydraulics and flooding potential, as well stormwater management, would be the same as described above for Alternative 3A.

Bridge Alignment B - East Curve Alignment. Construction of a bridge with the east curve alignment would have effects similar to those associated with Alignment A, in that the constriction caused by the existing temporary bridge would be removed, and 100-year flood levels would be reduced.

4.2.2.3 Alternative 3C [Levee Alignment 3 + Bridge Alignment C]

Levee Alignment 3. Impacts to hydraulics and flooding potential, as well stormwater management, would be the same as described above for Alternative 3A.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Construction of a bridge with the Rattlesnake Canyon Road alignment would have effects similar to those associated with Alignment A, in that the constriction caused by the existing temporary bridge would be removed, and 100-year flood levels would be reduced.

4.2.2.4 Alternative 1A [Levee Alignment 1 + Bridge Alignment A]

Levee Alignment 1. The differences between this alternative and Levee Alignment 3 include the length, alignment, and width of the levee; the construction of three spur dikes and silt fences upstream of the levee; and elimination of the guide vane near the upstream end of the levee.

The levee with this alternative is longer and wider than the Alternative 3A levee, and more realignment of the low flow channels would be required. For this alternative, both the Chappo (22) Area borrow site as well as the East Oscar borrow site would be used. Access to the East Oscar borrow site would be by Rifle Range Road, which would be temporarily re-established as the north-south access in this area.

The spur dikes and silt fences would result in some alteration of flows in the upstream project area. Additionally, the spur dikes would redirect the flow of the Santa Margarita River. Changes in flow patterns would occur near the dikes and silt fences with resulting sedimentation. These changes

would eventually cause build up of sediments, reduced flow velocities on the south side of the channel, and new riverine habitat. However, increased flood levels would occur in this upstream area.

Stormwater Management System. The Stormwater Management System for Levee Alignment 1 would be similar to that described for Levee Alignment 3 (Section 4.2.2.1). However, Levee Alignment 1 would allow temporary inundation of an area west of MCAS Camp Pendleton (Figure 2.3-8). There would be no additional impacts to hydrology from the proposed Stormwater Management System for Levee Alignment 1.

Bridge Alignment A - Basilone Road - Existing Alignment. Impacts would be the same as described for the Alternative 3A bridge alignment.

4.2.2.5 Alternative 1B [Levee Alignment 1 + Bridge Alignment B]

Levee Alignment 1. Impacts would be the same as described above for Alternative 1A levee alignment.

Bridge Alignment B - East Curve Alignment. Impacts would be the same as described for the Alternative 3B bridge alignment.

4.2.2.6 Alternative 1C [Levee Alignment 1 + Bridge Alignment C]

Levee Alignment 1. Impacts would be the same as described above for Alternative 1A levee alignment.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Impacts would be the same as described for the Alternative 3C bridge alignment.

4.2.2.7 Alternative 2A [Levee Alignment 2 + Bridge Alignment A]

Levee Alignment 2. The differences between this alternative and Levee Alignment 1 include the length and alignment of the levee; the construction of six spur dikes and silt fences upstream of the levee; and elimination of the guide vane near the upstream end of the levee. The spur dikes and silt fences would result in some alteration of flows and sedimentation in the upstream project area, as discussed for Alternative 1A. Additionally, the spur dikes would redirect the flow of the Santa Margarita River. For this alternative, only the borrow site at Chappo (22) Area would be used.

As with Alternative 1A, portions of MCB Camp Pendleton and MCAS Camp Pendleton would be protected from inundation by the 100-year flood. However, this alternative would cause some constriction of flows near the pump station. Because the floodplain is broad in this area, the effects on flood levels are expected to be minimal, regardless of the frequency of the event. Other hydraulic effects are expected to be similar to those described for Alternative 1A.

Stormwater Management System. Impacts would be the same as described for the Stormwater Management System for Alternative 1A.

Bridge Alignment A - Basilone Road - Existing Alignment. Impacts would be the same as described for the Alternative 1A bridge alignment.

4.2.2.8 Alternative 2B [Levee Alignment 2 + Bridge Alignment B]

Levee Alignment 2. Impacts would be the same as described above for Alternative 1A levee alignment.

Bridge Alignment B - East Curve Alignment. Impacts would be the same as described for the Alternative 1B bridge alignment.

4.2.2.9 Alternative 2C [Levee Alignment 2 + Bridge Alignment C]

Levee Alignment 2. Impacts would be the same as described above for Alternative 1A levee alignment.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Impacts would be the same as described for the Alternative 1C bridge alignment.

4.2.2.10 No Action Alternative

With the No Action Alternative, hydraulic conditions would not be affected, and the current potential for flooding of MCAS Camp Pendleton would remain unchanged and would have the potential for significant adverse impacts. The purpose of the Proposed Action, however, is to provide flood control. With the No Action Alternative, the existing temporary levee would be left in place. Although this would provide some level of protection to the MCAS Camp Pendleton airfield, it is not likely to maintain its integrity and provide protection in the event of a 100-year flood. The existing temporary levee extends only halfway down the total length of the airfield, and MCAS Camp Pendleton would be subject to significant inundation from backwater effects from a 25-year

or greater flood event. These flooding events would have the potential for contaminating Base production water wells as well as disruption of military operations and training.

The No Action Alternative would include leaving the existing temporary bridge at Basilone Road in place. The existing Basilone Road Bridge would be subject to significant damage resulting from flooding during a 100-year event. If the bridge did not fail during a major storm, it would create a constriction which would elevate flood levels upstream of the bridge.

4.2.2.11 Analysis of Significance

The reduced potential for flooding at portions of MCB Camp Pendleton and MCAS Camp Pendleton and the replacement of the Basilone Road Bridge would have beneficial effects. No significant adverse impacts to channel hydraulics would occur for alternatives other than the No Action Alternative. However, although not considered significant, Alternative 1 would cause the greatest changes to the hydraulic flow regime of the river.

4.2.1.12 Mitigation Measures

Levee Alignment 3. This levee alignment has been designed to minimize potential impacts to the hydraulic conditions of the Santa Margarita River. This alignment was also designed to not require any routine maintenance. An upstream guide vane would be constructed as part of the main levee. The guide vane would mitigate the potential for turbulent flow conditions and associated erosion potential at the upstream end of the levee. Areas of the river that are isolated would be mitigated by onsite monitoring as indicated in Section 4.3.

Levee Alignment 1. This levee alignment would create the greatest effects on riverine hydraulics. Selection of the preferred alternative (Levee Alignment 3) would mitigate these effects.

Levee Alignment 2. This levee alignment would create effects on riverine hydraulics. Selection of the preferred alternative would mitigate these.

Bridge Alignments. All bridge alignments are designed to mitigate the potential for constriction of storm flows and backwater effects associated with the existing temporary bridge.

4.2.3 Water Quality

4.2.3.1 Criteria for Significance Determination

Water quality impacts would be considered significant if the project had the potential to appreciably degrade the quality of either surface water or groundwater. Such impacts would include increasing the potential for flooding in areas of soil contamination.

4.2.3.2 Impact Analysis

Project effects on water quality are not dependent on either the levee alignment or the bridge alignment selected. Regardless of the alignments, the project would have very little effect on water quality. The proposed project effects which encompasses all alternatives except for the No Action Alternative on groundwater and surface water quality are discussed below.

Surface Water Quality. During site clearing and construction of the proposed levee and bridge, there would be some temporary disturbance of the channel which could lead to short-term increases in turbidity and TDS which are not considered to be significant. Neither clearing nor construction would occur during storm conditions. Since flows exceed 300 cfs only about 7 days per year, it is expected that most of these activities would occur in the dry areas surrounding the low flow channel. However, some realignment of the low flow channel would occur during levee construction, and channel diversions would occur during bridge construction. In these cases, the majority of the material involved would be alluvial sands and gravels rather than finer materials which could lead to turbidity problems. For all of the reasons stated above, impacts to turbidity and surface water quality during construction are not expected to be significant.

The proposed levee would protect portions of MCB Camp Pendleton and MCAS Camp Pendleton from flood inundation during a storm event equal to or less than a 100-year event. Therefore, any potential exposure of flood flows to areas identified in the IR Program as having environmental contaminants of concern would be eliminated. Stormwater runoff would be temporarily detained and then discharged to the river channel. Stormwater is currently discharging to the Santa Margarita State River in accordance with the MCB Camp Pendleton Stormwater Monitoring Plan. The project would not change this nor add any contamination to the stormwater. Therefore, no effect on water quality is anticipated.

Groundwater Quality. During the construction period of the bridge and stormwater facility, it is estimated that dewatering would occur over a period of about 90 days total. Discharge of water from dewatering activities would be performed in accordance with the construction permit. A diffuser would be placed at the end of the discharge pipe to prevent localized increases of sediments. Since

dewatering would involve pumping of groundwater, dewatering is not expected to have any significant impact on groundwater and surface water quality.

4.2.3.3 Analysis of Significance

No significant impacts to either surface water or groundwater quality have been identified for project alternatives. The No Action Alternative has the potential for significant impacts to groundwater quality associated with Base production wells. The No Action Alternative also has the potential for significant impacts from sheet water flow of storm water from a portion of the runway. Run off from the runway into the Santa Margarita River has the potential of introducing contaminants of concern into surface water.

4.2.3.4 Mitigation Measures

Since no significant impacts to either surface water or groundwater quality have been identified, no mitigation measures are required.

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4.3 BIOLOGICAL RESOURCES

Impacts to the biological resources observed or expected in the project area were evaluated for significance based on the sensitivity status and quality of the resource, and the nature and extent of the impact. For purposes of this analysis, resources are generally considered sensitive if they are limited in distribution and their ecological role is critical within a regional and local context. Habitats supporting species listed as threatened or endangered under the Federal Endangered Species Act of 1973 are also regarded as sensitive resources. In addition, the following criteria were considered as sensitive habitats:

- Natural areas, communities, and habitats of plant and wildlife species that are restricted in distribution;
- Habitat that is critical to species or a group of species for feeding, breeding, resting, and migrating; and
- Corridors or areas that link substantial wildlife habitats.

Direct or indirect impacts may occur to sensitive resources as a result of construction of the proposed levee project. A direct impact would occur if the primary effects of the project would result in a loss of habitat that reduces the density or diversity of biological resources within the region. An indirect impact would occur from a secondary effect of the project. However, an indirect impact may have the same or greater magnitude as a direct impact.

The sensitivity status of the resource must also be considered in evaluating the significance of any impact. For certain highly sensitive resources (i.e, an endangered species or jurisdictional wetlands), any impact would be perceived as significant. Impacts to resources with a relatively low sensitivity status (i.e., species with a large, locally stable population) would not necessarily be considered significant, given the less sensitive nature of the resource.

4.3.1 Criteria for Significance Determination

Natural areas, communities, and habitats of plant and wildlife species that are restricted in distribution include:

- All habitats dominated by native plant species and which occur within the floodplain of the Santa Margarita River (riparian habitats);

- All habitats determined to represent wetlands or waters of the United States under the jurisdiction of the ACOE; and

- Coastal sage scrub vegetation.

Impacts to these habitats are considered significant. Human settlement and land use within the region has substantially reduced the amount of these habitats from their original areal extent. Habitats considered to be jurisdictional wetlands or waters of the United States have unique functions and values that have been determined to be important for the maintenance of environmental quality (U.S. Army Corps of Engineers, 1995a). These functions and values provide habitat for wildlife including threatened and endangered species, and maintain the hydrogeomorphic characteristics essential to the biologically rich and healthy riparian, riverine and estuarine system of the Santa Margarita River.

A delineation of wetlands and waters of the United States occurring in the project area has been conducted. This delineation identifies those portions of habitat that represent jurisdictional wetlands or waters of the United States which are under the jurisdiction of the ACOE. Portions of the following vegetation/habitat types represent wetlands:

- Freshwater marsh;
- Riparian scrub;
- Riparian woodland;
- Mixed willow exotic;
- Tamarisk;
- Arundo; and
- Open water/gravel, mud.

Coastal sage scrub vegetation has been widely recognized as a declining resource on a regional and national basis. It provides habitat for the coastal California gnatcatcher and other sensitive wildlife.

Impacts to habitat areas likely to be occupied or used by species listed as threatened or endangered by the USFWS are considered significant. These include areas otherwise considered non-sensitive habitat. Because of the nature of the vegetation within the project area (which forms a complex mosaic of plant communities, at times differing only in the percentage of occurrence of certain components), viable endangered species habitat is contained within broader mapping units for the project area. For example, Arundo dominated vegetation is not typically considered high quality endangered species habitat; however, listed bird species breed in trees and shrubs too sparse to map within Arundo habitat. Any impacts to those areas may be considered significant. In addition, due to the mosaic nature of vegetation type distribution within the project area, these listed species do forage in and traverse areas with large amounts of non-native vegetation.

4.3.2 Impacts

A summary of the direct permanent and temporary impacts to vegetation that would result from implementation of the nine alternatives is presented in Table 4.3.2-1. Indirect impacts to vegetation resulting from the isolation of floodplain habitats by the three levee alternative alignments are summarized in Table 4.3.2-2. Table 4.3.2-3 summarizes the direct and indirect impacts to wetlands that would result from implementation of the three levee alignment alternatives. In addition to indirect impacts resulting from isolation; changes in hydrology, hydraulics, sedimentation, scouring, fugitive dust, construction activity, lighting and other project related effects may impact biological resources in the affected area. These effects would occur primarily in the active floodplain and on uplands adjacent to project components including the borrow sites, bridge approaches, and hillside grading areas.

The magnitude of permanent and temporary direct impacts (Table 4.3.2-1 and Appendix D) associated with the nine alternatives may be grouped in ascending order as follows:

- Alternatives 3A, 3B, 3C
- Alternatives 2A, 2B, 2C
- Alternatives 1A, 1B, 1C

The acreages provided below were calculated using the Geographical Information System (GIS) database digitized from vegetation maps which were prepared using aerial photographs dated 1994 and 1995. The initial mapping produced from interpretation of these photographs were revised based on field truthing, and reviewed and revised by MCB Camp Pendleton biologists. As such, the level of accuracy is consistent with the hand mapping of complex vegetation patterns. Relatively small groupings of vegetation types may be below the mapping scale, and in those instances certain vegetation may be contained within larger, broader mapped communities. More detailed mapping of the riparian vegetation in the area is currently in progress. The GIS-produced acreage calculations allow a comparison of impacts between the various alternatives. Included in the acreages below are disturbed/developed lands. These areas typically have no intrinsic value as wildlife habitat, and are included in this discussion solely to account for the entire area to be permanently occupied by the constructed facilities or to be temporarily used during construction. Revegetation following temporary impacts of low quality habitats will result in a net benefit to habitat. In addition, direct impacts to Diegan coastal sage scrub (located outside of the floodplain and associated primarily with the bridge alternatives) are also presented separately for each alternative. Indirect impacts resulting from isolation of floodplain vegetation are also provided.

Table 4.3.2-1

Direct Impacts to Vegetation and Habitat Resulting from the Implementation of the Nine Alternatives

Alternative		3A		3B		3C		1A		1B		1C		2A		2B		2C	
Vegetation/Habitat Type	Significance	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary
Arundo*	SWL	3.4	7.8	4.1	7.8	3.2	6.4	7.1	7.8	7.8	7.8	6.9	6.4	3.2	6.4	3.9	6.4	3.0	5.0
Diegan Coastal Sage Scrub	S	0.8	0.4	1.2	0.5	2.3	2.4	21.1	0.4	21.5	0.5	22.6	2.4	21.1	0.4	21.5	0.5	22.6	2.4
Freshwater Marsh	S SWL	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.2	0.5	0.2	0.5	0.2
Grass Forb Mixed	SWL	4.7	10.8	4.7	10.8	5.0	11.7	15.5	16.7	15.5	16.7	15.8	17.6	11.8	14.0	11.8	14.0	12.1	14.9
Mixed Willow Exotic	S	4.1	8.6	4.2	8.7	5.1	11.1	13.9	13.1	14.0	13.2	14.9	15.6	10.2	10.8	10.3	10.9	11.2	13.3
Riparian Scrub	S SWL	0.1	0.4	0.5	0.5	0.8	0.4	5.4	2.3	5.8	2.4	6.1	2.3	4.9	1.5	5.3	1.6	5.6	1.5
Riparian Woodland	S SWL	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.9	0.8	0.9	0.8	0.9	0.2	0.7	0.2	0.7	0.2	0.7
Tamarisk*	SWL	0.0	0.0	0.0	0.0	0.0	0.0	1.6	2.8	1.6	2.8	1.6	2.8	0.6	2.2	0.6	2.2	0.6	2.2
Open Water, Gravel, Mud	S SWL	1.7	3.5	1.9	3.7	1.9	3.8	5.7	4.3	5.9	4.5	5.9	4.6	2.6	3.7	2.8	3.9	2.8	4.0
Subtotal Vegetation & Habitat		**14.8**	**31.5**	**16.6**	**32.0**	**18.3**	**35.8**	**71.4**	**48.6**	**73.2**	**49.1**	**74.9**	**52.9**	**55.1**	**39.9**	**56.9**	**40.4**	**58.6**	**44.2**
Disturbed/Developed	NS	13.7	11.6	13.2	12.0	13.6	12.2	15.9	13.7	15.4	14.1	15.8	14.3	8.0	12.5	7.5	12.9	7.9	13.1
TOTAL		**28.5**	**43.1**	**29.8**	**44.0**	**31.9**	**48.0**	**87.3**	**62.3**	**88.6**	**63.2**	**90.7**	**67.2**	**63.1**	**52.4**	**64.4**	**53.3**	**66.5**	**57.3**

The significance of impacts to habitat in the affected area varies with the habitat function under consideration. Arundo and tamarisk habitats are dominated by invasive non-native plant species. The loss of habitat dominated by these species is not significant unless it represents jurisdictional wetlands or provides habitat for species listed as threatened or endangered by the U.S. Fish and Wildlife Service. The definition of the indicators of significance in this column follow:

NS Not Significant

S Loss of this habitat is considered significant on a regional basis.

SWL Considered significant because it may provide habitat for wildlife species listed as threatened or endangered by the U.S. Fish and Wildlife Service.

* Temporary disturbance to areas supporting invasive exotic species such as Arundo and tamarisk, and replacement with appropriate native vegetation would ultimately result in higher quality habitat, and representing a beneficial impact of the project.

Table 4.3.2-2
Indirect Impacts due to
Isolation from the Santa Margarita Floodplain

Alternative Levee Alignment 3	
Vegetation/Habitat Type	**Total Acres**
Open Water/gravel, mud	0.2
Mixed Willow Exotic	26.3
Arundo	9.5
Grass-Forb Mix	25.2
Subtotal Habitat Isolated	**61.2**
Disturbed/Developed	433.5
Total Area	**494.7**
Alternative Levee Alignment 1	
Vegetation/Habitat Type	**Total Acres**
Riparian Woodland	0.1
Open Water/gravel, mud	4.8
Freshwater Marsh	0.8
Mixed Willow Exotic	67.0
Tamarisk	2.7
Arundo	32.9
Grass-Forb Mix	51.8
Subtotal Habitat Isolated	**160.1**
Disturbed/Developed	450.9
Total Area	**611**
Alternative Levee Alignment 2	
Vegetation/Habitat Type	**Total Acres**
Open Water/gravel, mud	0.3
Mixed Willow Exotic	41.1
Tamarisk	3.1
Arundo	20.8
Grass-Forb Mix	43.9
Subtotal Habitat Isolated	**109.2**
Disturbed/Developed	438.5
Total Area	**547.7**

Table 4.3.2-3

Summary of Wetland Acres Directly Impacted from Project Alternatives

Alternative 3 (Levee Alignment 3, Bridge Alignments A, B and C)				
Temporary	**Permanent**		**Full Isolation[1]**	**Partial Isolation[2]**
9.6	2.6	Jurisdictional	3.8	6.8
1.5	2.0	Non-Jurisdictional	0.9	
Alternative 1 (Levee Alignment 1, Bridge Alignment A, B and C)				
Temporary	**Permanent**		**Full Isolation[1]**	**Partial Isolation[2]**
11.5	12.8	Jurisdictional	21.5	6.9
		Non-Jurisdictional	4.5	
Alternative 2 (Levee Alignment 2, Bridge Alignment A, B and C				
Temporary	**Permanent**		**Full Isolation[1]**	**Partial Isolation[2]**
18.2	30.5	Jurisdictional	5.2	32.9
		Non-Jurisdictional	4.5	

[1]Full isolation behind the levee.
[2]Partial isolation due to either spur dike location or guide vane configuration.

The combined direct permanent and temporary impacts of alternatives 3A, 3B, and 3C range from 71.6 acres (consisting of 46.3 acres of habitat and 25.3 acres of currently disturbed/developed areas) to 79.9 acres (54.1 acres of habitat and 25.8 acres of disturbed/developed). Indirect impacts to habitat resulting from isolation associated with Levee Alignment 3 are the lowest (61.2 acres) of the three alignments (as shown in Table 4.3.2-2), with the remainder of the total area isolated consisting of currently disturbed/developed areas.

Alternatives 1A, 1B, and 1C would result in direct permanent and temporary impacts ranging from 124.8 acres (95.2 acres of habitat and 29.6 acres of currently disturbed/developed) to 133.1 acres (103.0 acres of habitat and 30.1 acres of currently disturbed/developed). Indirect impacts to habitat resulting from isolation associated with Levee Alignment 1 are the highest (160.1 acres) of the three alignments (as shown in Table 4.3.2-2), with the remainder of the total area isolated consisting of currently disturbed/developed areas.

Alternatives 2A, 2B, and 2C would result in direct permanent and temporary impacts ranging from 90.7 acres (70.2 acres of habitat and 20.5 acres of currently disturbed/developed) to 99.0 acres (78.0 acres of habitat and 21 acres of currently disturbed/developed). Indirect impacts to habitat resulting from isolation associated with Levee Alignment 2 are intermediate (109.2 acres) between Alignment 3 and Alignment 1 (as shown in Table 4.3.2-2), with the remainder of the total area isolated consisting of currently disturbed/developed areas.

4.3.2.1 Alternative 3A [Levee Alignment 3 + Bridge Alignment A] - Preferred Alternative

The relationship between the infrastructure components of Alternative 3A and the existing biological resources are shown in Figure 4.3-1. Construction of Levee Alignment 3 would permanently disturb 24.3 acres (including eliminating 13.1 acres of habitat and 'disturbing' 11.2 acres of currently disturbed/developed areas) and the associated construction corridor would temporarily disturb 38.4 acres (28.6 acres of habitat, 9.8 acres of disturbed/developed). (Appendix D)

The stormwater management system includes a pump house on 0.7 acres within the levee footprint.

The Bridge Alignment A contains approaches and bents which would permanently disturb 4.2 acres (1.7 acres of habitat, 2.5 acres of disturbed/developed) and temporarily disturb 4.7 acres (2.9 acres of habitat, 1.8 acres of disturbed/developed) (Appendix D). Earthwork associated with both levee and bridge construction would disturb 17 acres (all previously disturbed) only in the Chappo (22) Area borrow site (personal communication, Steve Cox, Winsler & Kelly, 1997).

The combined direct impacts to vegetation and habitat which would be affected by Alternative 3A are summarized in Table 4.3.4-1. Construction would permanently cover 13.7 acres of

disturbed/developed areas, and an additional 11.6 acres of disturbed/developed lands would be temporarily used during construction. These direct impacts to previously disturbed areas would total 25.3 acres and are not considered significant. Impacts to all other vegetation and habitat types are considered significant. Permanent significant direct impacts would total 14.8 acres. Temporary significant direct impacts would total 31.5 acres. The total significant direct impacts resulting from the construction of Alternative 3A would be 46.3 acres. Components of Alternative 3A are discussed below.

Levee Alignment 3

Vegetation. The construction of Levee Alignment 3 would result in significant impacts to vegetation. The impact acreage is provided in Appendix D. In certain cases, impacts to vegetation may not be considered significant based upon its intrinsic biological value (for example, vegetation dominated by exotic species), but the impacts may be considered significant relative to endangered species use of this habitat in conjunction with higher quality habitat. Revegetation following temporary impacts of low quality habitats would result in a net benefit to habitat.

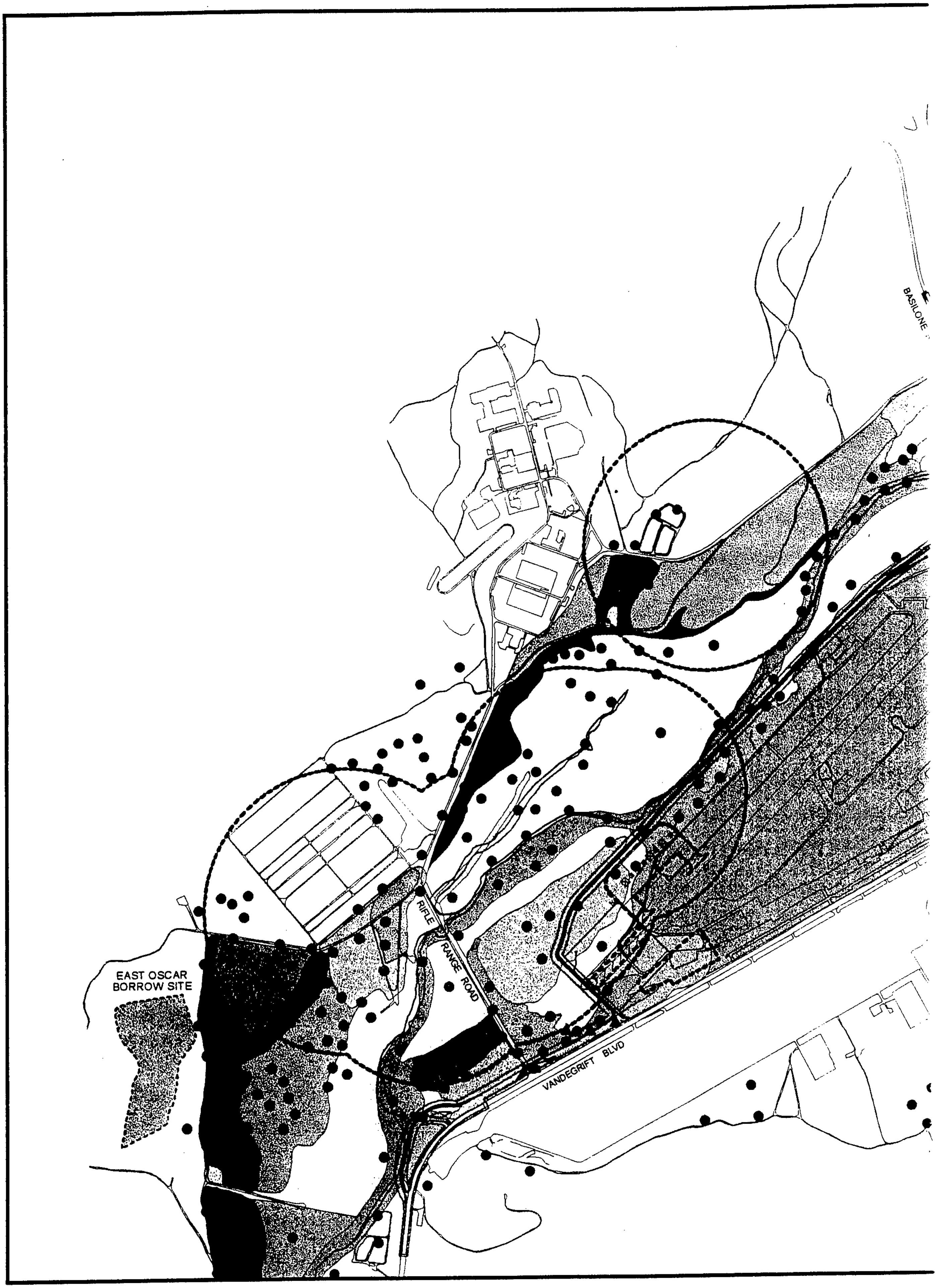
Direct Impacts to Vegetation -Levee Alignment 3.

Implementation of Levee Alignment 3 would directly affect a total of 62.7 acres. This includes 24.3 acres of permanent impact and 38.4 acres of temporary impacts. Temporary impact acreage includes areas of revetment expected to support the riparian vegetation which would be replaced. However, an area of approximately 0.1 acre would be used as an energy dissipator. The revetment in this small area would not be covered and vegetation would not be placed in this area. Implementation of Levee Alignment 3 would permanently remove an additional 0.1 acre of habitat at the energy dissipator (100 feet by 50 feet) located out from the toe of the levee at the pump station.

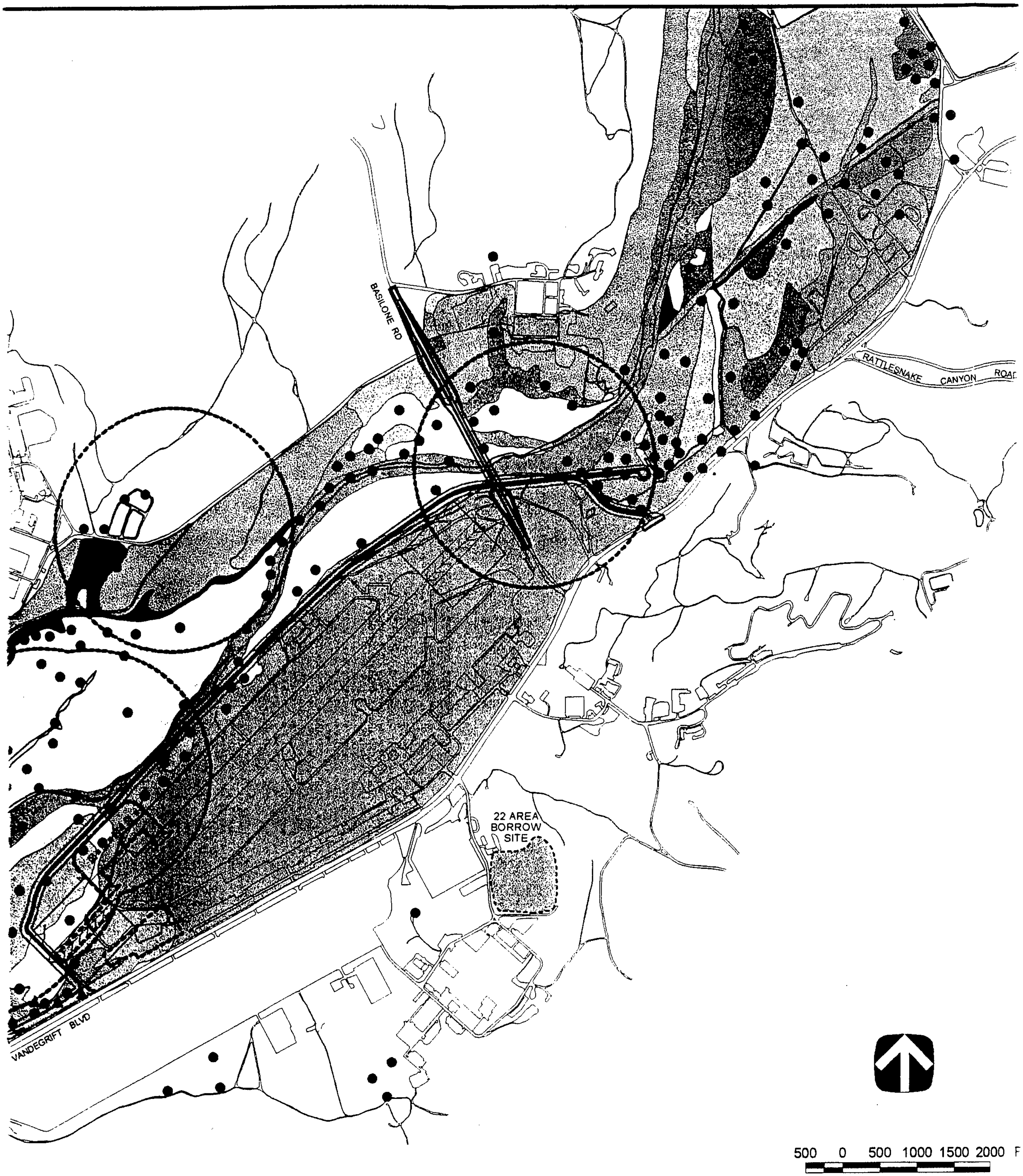
The direct impacts to vegetation types associated with the construction of the levee would occur primarily from vegetation removal, and grading and placement of the earth and concrete levee materials. Permanent habitat loss would occur within the levee footprint. Of the total area which would be permanently affected, 5.8 acres represent significant impacts and are discussed below.

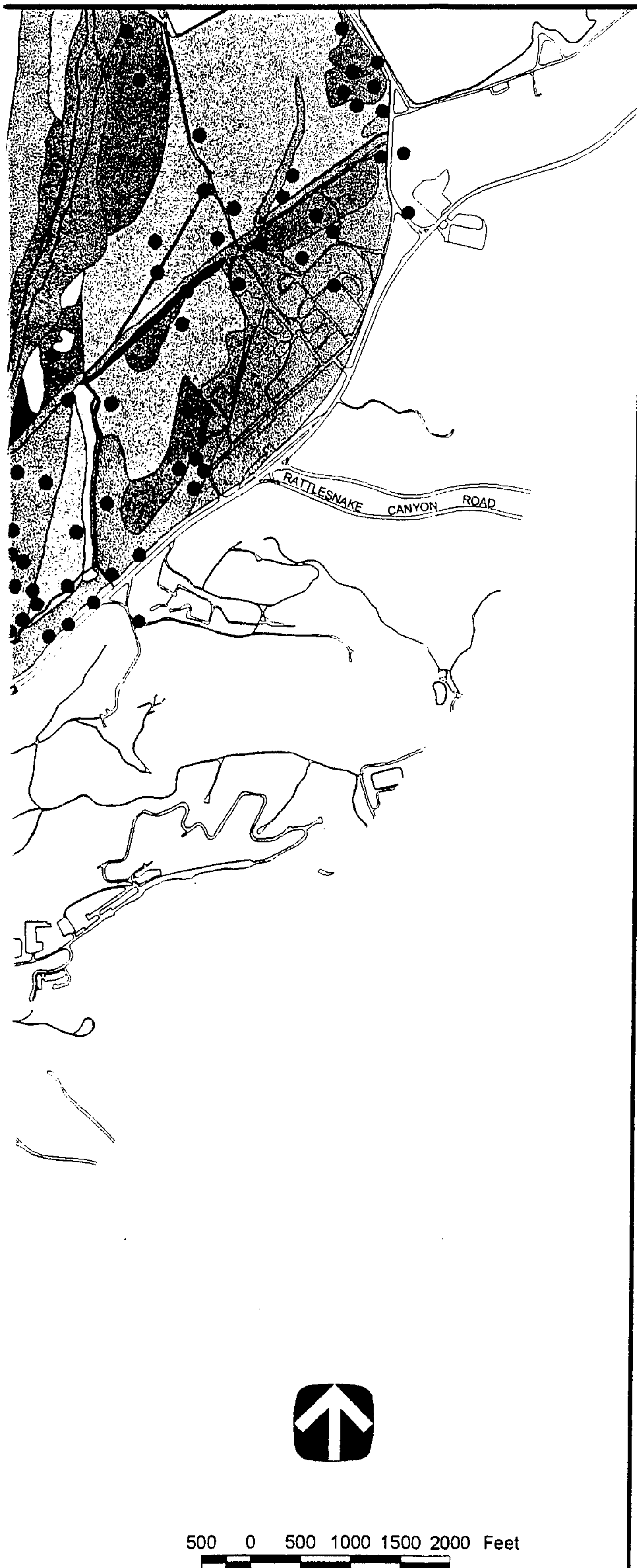
- Construction of Levee Alignment 3 would result in the permanent loss of 4.1 acres of mixed willow exotic vegetation. The magnitude of this direct impact to mixed willow exotic vegetation can be reduced to a level that is not significant.

- Construction of Levee Alignment 3 would result in the permanent loss of 1.7 acres of open water/gravel, mud. The magnitude of this direct impact to open water/gravel, mud habitat can be reduced to a level that is not significant.


BASILONE
EAST OSCAR
BORROW SITE
RIFLE
RANGE
ROAD
VANDEGRIFT BLVD

(1)


BASILONE RD
RATTLESNAKE CANYON ROAD
22 AREA BORROW SITE
VANDEGRIFT BLVD
500 0 500 1000 1500 2000 F



Construction Alternatives
- Permanent Footprint
- Construction Corridor

Basemap Features
- Hydrology Features
- Roads, Parking, Airfield
- Borrow Site
- BRAC Projects

Habitat Categories
- Arundo
- Diegan Coastal Sage Scrub
- Disturbed
- Freshwater Marsh
- Grass Forb Mix
- Mixed Willow Exotic
- Riparian Scrub
- Riparian Woodland
- Tamarisk
- Water Gravel Mud

Species
- Southwestern Flycatcher
- Least Bell's Vireo
- Arroyo Southwestern Toad (500M Buffer)

Alternative 3A
Habitat Impact and
Sensitive Species

Figure 4.3 - 1

In addition to these significant impacts, the construction of Levee Alignment 3 would result in the permanent loss of Arundo, disturbed/developed lands, and grass-forb mix (Appendix D). These vegetation types are not considered intrinsically sensitive and their loss does not represent a significant impact.

Temporary direct impacts to vegetation would result from the removal of vegetation and use of the construction corridor surrounding the levee. Upon completion of construction, the temporarily affected area (including the area of revetment, except for about 0.1 acres as described above) would be restored to the original vegetation type where appropriate, in a manner consistent with that described in the USFWS programmatic riparian and estuarine Biological Opinion and MCB Camp Pendleton conservation plan. Areas characterized by existing vegetation dominated by invasive exotics would be restored to appropriate native plant communities. Of the total area temporarily affected by the proposed project, 11.8 acres are considered to represent significant impacts and are discussed below.

- Construction of Levee Alignment 3 would result in the temporary loss of 8.6 acres of mixed willow exotic vegetation. The magnitude of this direct impact to mixed willow exotic vegetation can be reduced to a level that is not significant. Revegetation following temporary impacts of low quality vegetation would result in a net benefit to the ecosystem.

- Construction of Levee Alignment 3 would result in the temporary loss of 3.2 acres of open water/gravel, mud habitat. The magnitude of this direct impact to open water/gravel, mud habitat can be reduced to a level that is not significant.

In addition to these significant impacts, the construction of Levee Alignment 3 would result in the temporary use of areas currently supporting Arundo and grass-forb mix, as well as lands currently disturbed/developed (Appendix D). The first two vegetation types are not considered intrinsically sensitive and this temporary use does not represent a significant adverse impact. In fact, temporary disturbance to areas supporting invasive exotic species such as Arundo, and replacement with appropriate native vegetation represents a beneficial impact of the project. There would be no temporary impact to currently disturbed/developed areas.

Indirect Impacts to Vegetation - Levee Alignment 3.

Levee Alignment 3 is not expected to result in significant indirect effects on upland communities. The predominant indirect effects of constructing this alternative would result from modifications of flows in the Santa Margarita River which may affect wetland and riparian vegetation types. Potential significant effects are addressed in this section under indirect impacts to wetlands.

Wildlife and Sensitive Species. Both direct and indirect impacts to wildlife resources within and adjacent to the Santa Margarita River would occur as a result of construction of the proposed flood control project. Direct impacts involve the permanent and temporary removal of wildlife and habitat as a result of levee construction, as well as increased sedimentation, noise, and dust during construction activities. Indirect impacts include changes within the river which may alter the physical characteristics of occupied or occupiable habitat such that it may no longer be capable of supporting sensitive species. Similarly, because the Santa Margarita River is a dynamic system, these changes within the river may alter the physical characteristics of currently unoccupied or unoccupiable habitat in other areas such that it may be capable of supporting sensitive species in the future.

Direct Impacts to General Wildlife - Levee Alignment 3.

Construction of Levee Alignment 3 would result in direct impacts to wildlife present within the habitats subject to disturbance. Species that have larger home ranges or higher mobility (such as birds and certain small and medium-sized mammals) are expected to be displaced to adjacent areas of habitat at the onset of construction activity. However, wildlife that emigrate from the direct disturbance areas possess increased vulnerability to mortality by predation and unsuccessful competition with established individuals for food and territory. Within the direct disturbance areas, species of relatively low mobility (particularly burrowing small mammals, reptiles and amphibians) would likely be lost during initial ground-disturbing activities. In addition, raptor foraging areas may be disturbed by construction of Levee Alignment 3. Direct disturbance to and loss of general wildlife species is considered an adverse impact that is not significant, due to the relatively small amount of acreage to be disturbed.

Direct Impacts to Sensitive Wildlife - Levee Alignment 3.

Least Bell's Vireo. Construction of Levee Alignment 3 would result in the direct loss of occupied or occupiable breeding and foraging habitat of the federal and state endangered least Bell's vireo (vireo). Construction activities are expected to permanently impact 11.4 acres of vireo habitat (albeit low quality mixed willow exotic, Arundo, and grass-forb mix), and temporarily impact an additional 25.4 acres. Both permanent and temporary impacts to vireo habitat are expected to occur during two breeding seasons (15 March through 31 August), with temporary impacts expected to occur over an additional three to ten breeding seasons as the impacted areas gradually regain the vegetation characteristics of occupiable vireo habitat. The net result of the temporarily impacted areas will be beneficial to the vireo because the current low quality habitat will be replaced with higher quality native vegetation. According to data gathered during 1995, the Santa Margarita floodplain supported about 461 least Bell's vireos (comprised of nesting pairs, territorial males, and undetermined status males). Based on data gathered during 1996, the Santa Margarita floodplain

supported about 492 vireos, of which there are about 287 (pairs or males) present in the area of the proposed project. About 22 of these 287 made use of the area subject to direct permanent or temporary impacts as a result of Levee Alignment 3 construction, as shown on Figure 4.3-1.

The direct permanent disturbance to 11.4 acres of vireo habitat (consisting of 4.1 acres of mixed willow exotic, 3.2 acres of Arundo, and 4.1 acres of grass-forb mix), and temporary disturbance to 25.4 acres of vireo habitat (consisting of 8.6 acres of mixed willow exotic, 6.4 acres of Arundo, and 10.4 acres of grass-forb mix), will directly disturb a minimum of 22 vireos, likely through displacement (for a comparison of the numbers of endangered bird species subject to disturbance between the three levee alignments see the table below). No vireos are expected to be killed outright during construction activities, because vegetation clearing would be accomplished prior to the breeding season. In addition, some of the approximately 25 vireos which are present within about 250 feet of the limits of proposed construction may be directly disturbed by noise and dust generated during construction activities. These direct impacts (consisting of loss of breeding and foraging habitat, displacement of individuals, and disturbance due to noise and dust) to breeding vireos are considered significant.

The magnitude of these direct impacts to vireos can be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of increasing the quality of currently degraded vegetation to replace the lost vireo habitat, and avoidance of vegetation clearance during the breeding season.

Southwestern Willow Flycatcher. Construction of Levee Alignment 3 would result in the direct loss of occupied or occupiable habitat of the federal and state endangered southwestern willow flycatcher (flycatcher). According to data gathered during 1995, riparian vegetation along the Santa Margarita River supported ten pairs of flycatcher. Based on data gathered during 1996, there are five flycatcher territories along the Santa Margarita River in the area of the proposed project. One of these four include areas subject to direct permanent or temporary impacts as a result of Levee Alignment 3 construction, as also shown on Figure 4.3-1. No flycatchers are expected to be killed outright during construction activities, because vegetation clearing will be accomplished prior to the breeding season. In addition, three flycatcher territories which are present within about 250 feet of the limits of proposed construction may be directly disturbed by noise and dust generated during construction activities. These direct impacts (consisting of loss of habitat, displacement of individuals, and disturbance due to noise and dust) to flycatchers are considered significant. However, the mature trees which are known to be used by the flycatchers in the area will not be directly disturbed, based upon this sensitive species presence (Winsler & Kelly, 1997).

The magnitude of these direct impacts to flycatchers can be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting

primarily of increasing the quality of currently degraded vegetation to replace the lost flycatcher habitat, and avoidance of vegetation clearance during the breeding season.

Endangered Bird Species in Area to be Permanently and Temporarily Directly Impacted

Alternative Levee Alignment 3

Species	Numbers of Pairs (or males)
Least Bell's Vireo	22
Southwestern Willow Flycatcher	1

Alternative Levee Alignment 1

Species	Numbers of Pairs (or males)
Least Bell's Vireo	35
Southwestern Willow Flycatcher	0

Alternative Levee Alignment 2

Species	Numbers of Pairs (or males)
Least Bell's Vireo	37
Southwestern Willow Flycatcher	0

Arroyo Toad. Construction of Levee Alignment 3 may result in direct disturbance or mortality to arroyo toads (toads). Based on data gathered during 1996, arroyo toads occur along the Santa Margarita River from the eastern boundary of the base downstream to Stuart Mesa Road Bridge. Based on an evaluation of available toad location data, it appears that levee construction may not directly impact toad breeding pools. However, there is a potential for toad mortality by vehicle crushing in roadways and other construction areas. Without implementation of Best Management Practices, toads could be harmed from inadvertent fouling or pollution of the river water from accidental fluid spill or other construction material discharge, and increased construction-related sedimentation. For example, concreting activities that result in concrete or affected water reaching toad breeding areas could affect an entire years reproductive output within a limited area downstream of the contamination site, due to changes in pH.

These direct impacts to toad populations (through crushing and loss of larvae due to pollution and sedimentation) are considered significant.

The magnitude of these direct impacts to arroyo toads would be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of avoidance of construction activities during the toad breeding season (as practicable), the use of biological construction monitors to remove toads from harm's way in

construction areas, and the use of Best Management Practices to minimize the amount of construction-related sedimentation and the potential for fouling or pollution.

Southern Steelhead. Construction of Levee Alignment 1 would not likely result in direct disturbance to southern steelhead. The southern steelhead has not been documented as currently occurring aboard MCB Camp Pendleton. Recent surveys have not recorded this taxon. As such, this species is no longer considered in this document. However, the proposed project might affect the suitability of the Santa Margarita river for reintroduction of southern steelhead. Any such impact on this suitability is expected to be minimal based upon the results of the hydrological investigation which predicts that changes to the river outside the project reach will be minimal. In addition, any localized changes to flow patterns should be well within the steelhead's ability to continue upstream. When short term flows make upstream passage impossible, these fish tend to congregate in lower flow areas until the intense event has passed.

Federal Species of Concern. Construction of Levee Alignment 3 may result in direct disturbance to one or more federal wildlife species of concern. This direct disturbance is considered an adverse impact that is not significant due to the relative abundance and low sensitivity status of most federal species of concern.

Indirect Impacts to General Wildlife - Levee Alignment 3.

Construction of Levee Alignment 3 may result in indirect disturbance to general wildlife and habitat as a result of isolation behind the levee and removal from the floodplain. These isolated riparian habitats (consisting of 26.3 acres of mixed willow exotic, 9.5 acres of Arundo, and 0.2 acres of open water/open wash) may eventually change in character due to the lack of scour and deposition of sediment. The suite of wildlife species currently inhabiting these isolated habitats would then either acclimate to the gradual succession of early seral riparian scrub habitats to mature woodland habitats (in the case of habitat generalists), or would gradually emigrate from the area as habitat conditions change such that they could no longer be supported (in the case of habitat specialists). These wildlife habitat specialists would then be expected to be replaced by a suite of wildlife habitat specialists appropriate to more mature riparian vegetation types. This indirect impact to general wildlife species is not considered significant.

Indirect Impacts to Sensitive Wildlife - Levee Alignment 3.

Least Bell's Vireo and Southwestern Willow Flycatcher. Construction of Levee Alignment 3 may affect the distribution of least Bell's vireo and southwestern willow flycatcher as a result of isolation of the area behind the levee and its removal from the floodplain. These isolated habitats currently are occupied by about 14 least Bell's vireo, and may eventually change in character due

to the lack of scour and deposition of sediment which is critical to sustaining and regenerating high quality vireo habitat. This potential eventual degradation and elimination of vireo habitat represents a significant indirect impact. The magnitude of this indirect impact to vireo can be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of mechanical manipulation (as needed) of the vegetation isolated by the levee such that the functional value for high quality vireo habitat is maintained through time. While flycatchers may be affected, along the Santa Margarita River they appear to occur in more mature riparian habitats than do vireo (personal communication, Environmental Security, MCB Camp Pendleton, 1997). Whereas vireo tend to occur in more shrubby riparian vegetation, flycatchers make use of shrubby vegetation as well as large, mature willow trees. As such, flycatchers may do well within the isolated area, should the riparian vegetation mature into more woodland forms.

Arroyo Toad. Construction of Levee Alignment 3 may result in indirect disturbance to arroyo toads as a result of changes in the river. Any changes which would occur in the project area and which would negatively affect toads would likely be offset by changes which could positively affect toad habitat. The development of a mature riparian woodland in the area isolated behind the levee may continue to provide good (or better) toad habitat (personal communication, Environmental Security, MCB Camp Pendleton, 1997).

Wetlands. This analysis is based upon the recently completed delineation of waters of the United States and adjacent wetlands (Figures 4.3-1.1 through 4.3-1.3). All of the wetland acreage discussed below is also included in the vegetation/habitat acreages previously considered. The construction of Levee Alignment 3 would occur predominantly within the floodplain of the Santa Margarita River. Much of the affected vegetation and habitat is characterized as riparian and is dependent on water and the interaction of flowing water with the floodplain environment. The jurisdictional delineation for the project area evaluated the impacts to wetlands of 'Alternative 3' which includes Levee Alignment 3 and either of the Bridge Alignments A, B, or C.

Direct Impacts to Wetlands - 'Alternative 3'

Implementation of 'Alternative 3' would have direct adverse effects on both jurisdictional and non-jurisdictional wetlands for a total of 11.7 acres of wetlands, as shown in Table 4.3.2-3. The delineation identified 2.6 acres of jurisdictional and 2.0 acres of non-jurisdictional wetlands for direct permanent impacts, plus an additional direct temporary impact to 9.6 acres of jurisdictional and 1.5 acres of non-jurisdicational wetlands. The permanent and temporary loss of jurisdictional wetlands is a significant impact. The magnitude of this impact can be reduced to a level that is not significant.

Construction Alternatives
- Permanent Footprint
- Construction Corridor

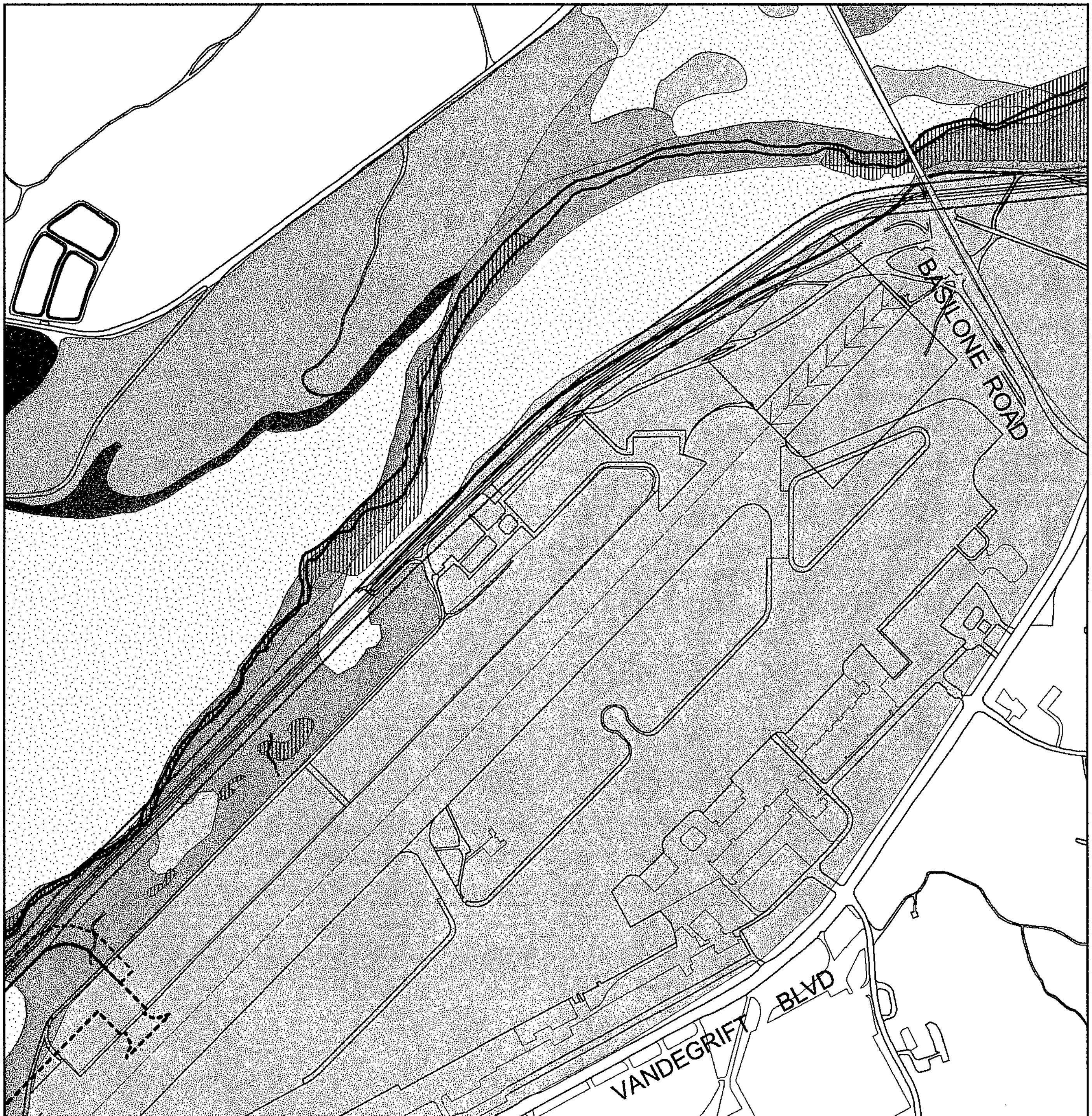
Basemap Features
- Hydrology Features
- Roads, Parking, Airfield
- BRAC Projects

Habitat Categories
- Arundo
- Diegan Coastal Sage Scrub
- Disturbed
- Freshwater Marsh
- Grass Forb Mix
- Mixed Willow Exotic
- Riparian Scrub
- Riparian Woodland
- Tamarisk
- Water Gravel Mud
- Wetlands
- Man-made Wetlands

500 0 500 1000 Feet

Wetlands Detail
Levee Alignment 3
Southwest Section

Figure 4.3 - 1.1



Construction Alternatives
- Permanent Footprint
- Construction Corridor

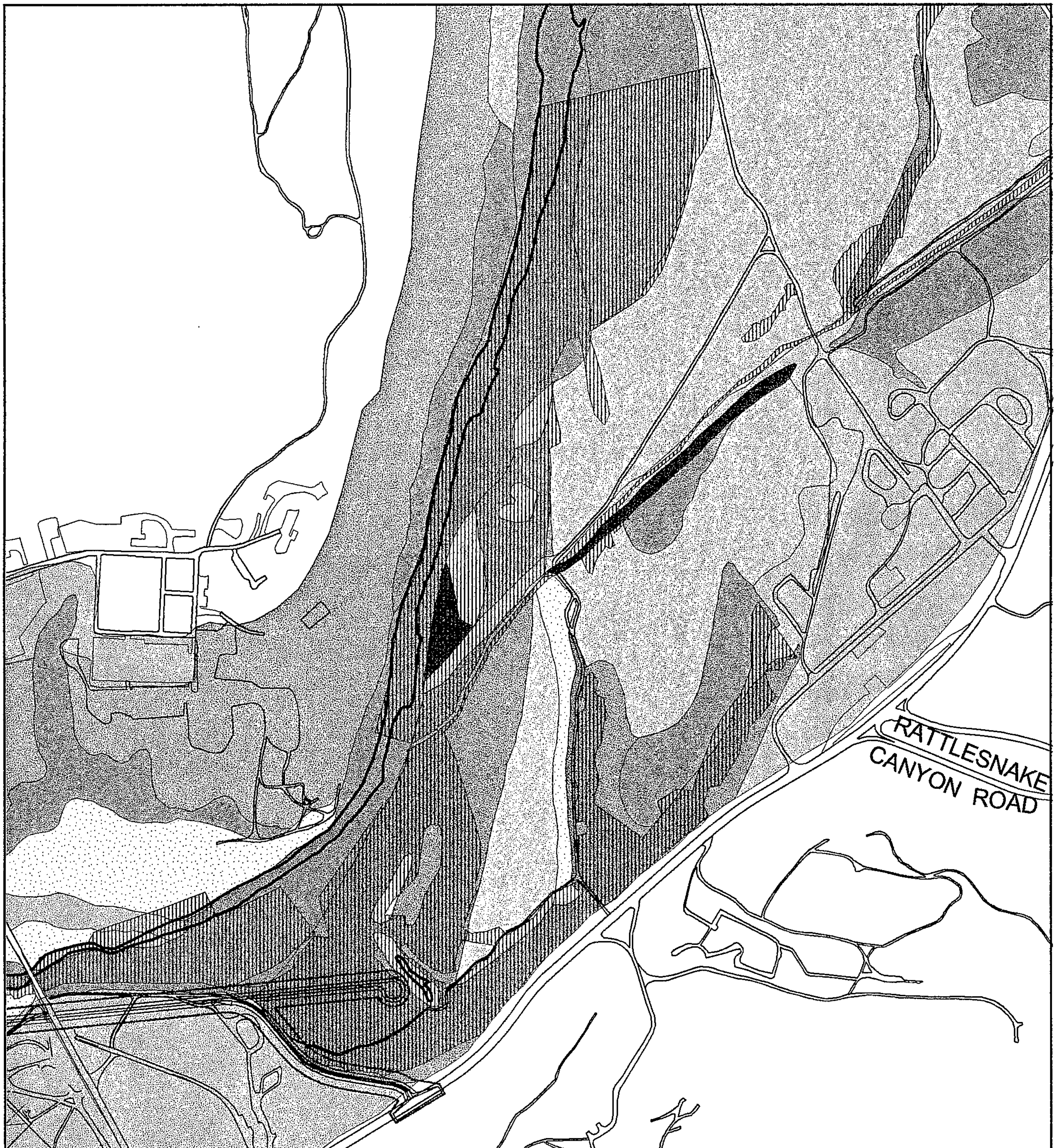
Basemap Features
- Hydrology Features
- Roads, Parking, Airfield
- BRAC Projects

Habitat Categories
- Arundo
- Diegan Coastal Sage Scrub
- Disturbed
- Freshwater Marsh
- Grass Forb Mix
- Mixed Willow Exotic
- Riparian Scrub
- Riparian Woodland
- Tamarisk
- Water Gravel Mud
- Wetlands
- Man-made Wetlands

500 0 500 1000 Feet

Wetlands Detail
Levee Alignment 3
Mid Section

Figure 4.3 - 1.2



Construction Alternatives
Permanent Footprint
Construction Corridor

Basemap Features
Hydrology Features
Roads, Parking, Airfield
BRAC Projects

Habitat Categories
Arundo
Diegan Coastal Sage Scrub
Disturbed
Freshwater Marsh
Grass Forb Mix
Mixed Willow Exotic
Riparian Scrub
Riparian Woodland
Tamarisk
Water Gravel Mud
Wetlands
Man-made Wetlands

500 0 500 1000 Feet

Wetlands Detail
Levee Alignment 3
Northeast Section

Figure 4.3 - 1.3

Indirect Impacts to Wetlands - 'Alternative 3'

Construction of 'Alternative 3' will result in the full isolation (and loss) of 3.8 acres of jurisdictional and 0.9 acre of non-jurisdictional wetlands. This loss is expected to be permanent. In addition, 6.8 acres of jurisdictional wetlands will be partially isolated by the guide vane near the Ranch House Complex, as shown in Table 4.3.2-3. This partial isolation may represent a permanent impact, or the effect may occur on a temporary basis.

The technical studies completed for the project included detailed hydrologic investigations, as discussed in Section 4.2. These investigations included long term simulations of the hydraulic and sediment transport behavior of the Santa Margarita River. The primary hydraulic changes identified in these investigations that may affect wetland functions and values are summarized below:

- The behavior of the river system outside the project reach is predicted to be unaffected by any of the project alternatives.
- Each of the project alternatives constrains the ability of the channel to relocate within the project reach.
- Removal of the existing Basilone Road Bridge reduces the scour of the low flow channel profile by about 7 to 8 feet within 500 feet upstream and downstream of the bridge.
- Removal of the existing Basilone Road Bridge would tend to reduce the formation of terraces within 1,500 feet upstream of the bridge.
- Bedslope would become slightly steeper through the project reach.
- For the Preferred Alternative, localized scour would occur (extending 50 feet from the toe of the levee) at the upstream end of the guide vane, the turn towards Vandegrift Boulevard, and the nose near STP No. 3, on about a 25 year recurrence interval.
- For the Preferred Alternative, deposition of sediment (estimated at less than one foot per single event) would occur between Vandegrift Boulevard and the guide vane, on about a 25 year recurrence interval.

The factors chosen to assess potential project related effects on wetland functions are water surface profile and aggradation and degradation patterns and trends. Changes in water surface profile provide indicators of potential changes in overbank flow. Overbank flow is considered to be an

important contributor to the functional capacity of riverine wetlands (U.S. Army Corps of Engineers, 1995). Patterns and trends in aggradation (sedimentation) and degradation (scouring) also have important effects on riverine wetland functions. Aggradation and degradation may change patterns of overbank flow, fill or create low laying areas, cover wetland vegetation with sediments, expose previously buried substrates, change the texture of sediment substrates, and change the depth to ground water.

Construction of the proposed levee alignments would isolate riparian habitat from existing floodplain dynamics, preventing overbank flow, river meanders and other processes within the isolated area during all flood events less than or equal to the project design event. While these areas would be cut off from surface water interactions, groundwater elevation within the affected area would be unaffected by the project (MCB Camp Pendleton, 1995). Isolation would not adversely affect the supply of groundwater to existing vegetation dependent on this resource.

Overbank flow is an important component of riverine wetland and riparian dynamics and affects hydrologic, biogeochemical and habitat functions associated with wetlands (U.S. Army Corps of Engineers, 1995b). Overbank flow transports water, sediments, and nutrients into and out of riverine habitats, recharges groundwater, and provides other ecosystem services. In addition, scouring events provide locations for riparian vegetation regeneration and contribute to habitat diversity. Scouring and sedimentation events and meandering of the river channel would be eliminated or greatly decreased within the isolated area. Since these processes are required for normal turnover and reproduction in southern California riparian communities (Faber, *et al*, 1989) the character of the isolated communities may permanently change. This change represents a significant impact.

If local groundwater is close to the surface, these riparian communities may persist for many years. However, over time, exotic species capable of reproducing without regular exposure to scouring and sedimentation (such as Arundo) may replace the native components of this vegetation. While Arundo removal and riparian revegetation efforts may be capable of restoring native cover in the isolated area, the loss of overbank flows would prevent it from recovering complete riverine wetland functions. However, from a riparian vegetation perspective, the magnitude of this indirect impact as a result of isolation may be able to be reduced through mechanical manipulations such as thinning and creating openings and ecotones which would mimic succession.

In summary, construction of 'Alternative 3' would result in direct permanent and temporary, as well as indirect permanent and temporary impacts to a total of 22.8 acres of jurisdictional and 4.4 of non-jurisdictional wetlands. This impact is significant, but the magnitude can be reduced.

Stormwater Management System. The stormwater management system is described in Section 2.3.1.2.

Vegetation

Direct Impacts to Vegetation - Stormwater Management System.

Impacts to vegetation from implementation of the stormwater management system would result from construction of a pump station on about 0.7 acres of land.

Permanent Impact. Construction of the pump station on 0.7 acres would result in the permanent loss of mixed willow exotic vegetation and grass-forb mix vegetation. The permanent loss of mixed willow exotic vegetation is considered a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant, primarily through exploring facility siting options to avoid or reduce the acreage of mixed exotic willow vegetation impacted, and to compensate for any acreage which is unavoidably lost.

Indirect Impacts to Vegetation - Stormwater Management System.

No indirect impacts to vegetation are expected to occur as a result of the implementation of the stormwater management system.

Wildlife and Sensitive Species. Wildlife species and habitat may be impacted by construction and operation of the stormwater management system. Construction of a pump house on about 0.7 acres would result in direct impacts to wildlife present within the habitats subject to disturbance. Species that have larger home ranges or higher mobility (such as birds and certain small and medium-sized mammals) are expected to be displaced to adjacent areas of habitat at the onset of construction activity. However, wildlife that emigrate from the direct disturbance areas possess increased vulnerability to mortality by predation and unsuccessful competition with established individuals for food and territory. Within the direct disturbance areas, species of relatively low mobility (particularly burrowing small mammals, reptiles and amphibians) would likely be lost during initial ground-disturbing activities. Direct disturbance to and loss of wildlife species is considered an adverse impact that is not significant, due to the relatively small amount of acreage to be disturbed and the presence of similar habitat nearby.

Bridge Alignment A-Existing Basilone Road Bridge Alignment

Vegetation. The construction of Bridge Alignment A would have significant impacts to vegetation occurring in the proposed project area. The total permanent and temporary direct impacts resulting from the implementation of the alternative bridge alignments are included in Appendix D.

Direct Impacts to Vegetation - Bridge Alignment A-Existing Basilone Road Bridge Alignment.

Implementation of Bridge Alignment A would adversely affect a total of 8.9 acres. This includes 4.2 acres of permanent impact and 4.7 acres of temporary impacts. Some of this acreage has been previously disturbed in association with bridge construction, and contains only remnant components of the original vegetation. In addition, as a result of bridge replacement, removal of fill would allow the development of riparian vegetation on approximately 1.4 acres (personal communication, Environmental Security, MCB Camp Pendleton, 1997). This conversion to riparian vegetation would be a beneficial impact of the project.

Permanent Impacts. Permanent impacts to vegetation associated with the construction of Bridge Alignment A would occur primarily from grading, construction of the roadway approaches and placement of the piers. Of the total area permanently affected, up to 0.9 acre are considered to represent significant impacts.

Construction of the Bridge Alignment A would result in the permanent loss of up to 0.8 acre of vegetation characterized as Diegan coastal sage scrub. However, some of this vegetation has been previously disturbed and contains only remnant coastal sage scrub components. As such, this acreage is considered to represent the maximum amount of coastal sage scrub subject to disturbance. Actual acreage disturbed is expected to be less. The permanent loss of up to 0.8 acre of Diegan coastal sage scrub vegetation represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.

Construction of the Bridge Alignment A would result in the permanent loss of 0.1 acres of riparian scrub vegetation. The permanent loss of 0.1 acres of riparian scrub vegetation represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.

In addition to these significant impacts, the construction of Bridge Alignment A would result in the permanent loss of Arundo, grass-forb mix, and disturbed/developed lands (as shown in Appendix D). These vegetation types are not considered intrinsically sensitive, and their loss does not represent a significant impact.

Temporary Impacts. Temporary impacts to vegetation associated with the construction of Bridge Alignment A would occur primarily from vegetation removal, grading, access for and the use of heavy machinery within the construction corridor. Upon completion of construction, the temporarily affected area would be restored to the original vegetation type where appropriate, in a manner consistent with that described in the USFWS programatic riparian and estuarine Biological

Opinion and MCB Camp Pendleton conservation plan. Areas characterized by existing habitat dominated by invasive exotics would be restored to appropriate native vegetation types. Revegetation following temporary impacts of low quality vegetation will result in a net benefit to the ecosystem. Of the total area temporarily affected by the proposed project, 1.1 acres are considered to represent significant impacts, as detailed below.

Construction of the Bridge Alignment A would result in the temporary loss of 0.4 acre of Diegan coastal sage scrub vegetation. However, some of this vegetation has been previously disturbed and contains only remnant coastal sage scrub components. As such, this acreage is considered to represent the maximum amount of coastal sage scrub subject to temporary disturbance. Actual acreage disturbed is expected to be less. The temporary disturbance of up to 0.4 acre of Diegan coastal sage scrub represents a significant impact. The magnitude of this direct impact to coastal sage scrub vegetation can be reduced to a level that is not significant.

Construction of the Bridge Alignment A would result in the temporary loss of 0.4 acre of riparian scrub vegetation. However, some of this vegetation has been previously disturbed and contains only remnant riparian scrub components. As such, this acreage is considered to represent the maximum amount of riparian scrub subject to temporary disturbance. Actual acreage temporarily disturbed is expected to be less. The temporary loss of 0.4 acres of riparian scrub represents a significant impact. The magnitude of this direct impact to riparian scrub vegetation can be reduced to a level that is not significant.

Construction of the Bridge Alignment A would result in the temporary loss of 0.3 acre of open water/gravel, mud habitat. The temporary loss of 0.3 acre of open water/gravel, mud represents a significant impact. The magnitude of this direct impact to open water/gravel, mud can be reduced to a level that is not significant.

In addition to these significant impacts, the construction of Bridge Alignment A would result in the temporary use of areas currently supporting Arundo and grass-forb mix, as well as disturbed/developed lands (as shown in Appendix D). The first two vegetation types are not considered intrinsically sensitive and this temporary use does not represent a significant adverse impact. In fact, temporary disturbance to areas supporting invasive exotic species such as Arundo, and replacement with appropriate native vegetation represents a beneficial impact of the project. There would be no temporary impact to currently disturbed/developed areas (by definition).

Wildlife and Sensitive Species. Both direct and indirect impacts to wildlife resources within and adjacent to the Santa Margarita River will occur as a result of construction of the proposed bridge replacement project. Direct impacts involve the permanent and temporary removal of wildlife and habitat as a result of bridge construction, as well as increased sedimentation, noise, and dust during

construction activities. Indirect impacts include changes within the river which may alter the physical characteristics of occupied or occupiable habitat such that it may no longer be capable of supporting sensitive species. Similarly, because the Santa Margarita River is a dynamic system, these changes within the river may alter the physical characteristics of currently unoccupied or unoccupiable habitat in other areas such that it may be capable of supporting sensitive species in the future. In addition, noise and lighting associated with bridge operation may cause indirect impacts.

Direct Impacts to General Wildlife - Bridge Alignment A.

Construction of Bridge Alignment A would result in direct impacts to wildlife present within the habitats subject to disturbance. Species that have larger home ranges or higher mobility (such as birds and certain small and medium-sized mammals) are expected to be displaced to adjacent areas of habitat at the onset of construction activity. However, wildlife that emigrate from the direct disturbance areas possess increased vulnerability to mortality by predation and unsuccessful competition with established individuals for food and territory. Within the direct disturbance areas, species of relatively low mobility (particularly burrowing small mammals, reptiles and amphibians) would likely be lost during initial ground-disturbing activities. Direct disturbance to and loss of the majority of general wildlife species is considered an adverse impact that is not significant, due to the relatively small amount of acreage to be disturbed and the presence of similar habitat nearby.

Disturbance to roosting bats as a result of demolition of the existing Basilone Road Bridge would be a significant impact. Several species, including Brazilian free-tailed bat and big brown bat are known to roost under bridges along the Santa Margarita River, and may roost under the existing Basilone Road Bridge. The magnitude of this disturbance impact to roosting bats can be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting of surveying for roosting bats prior to bridge demolition and application of active exclusion practices if bats are present.

Direct Impacts to Sensitive Wildlife - Bridge Alignment A.

Least Bell's Vireo. Construction of Bridge Alignment A would result in the direct loss of occupied or occupiable breeding and foraging habitat of the least Bell's vireo. Construction activities are expected to permanently impact 0.9 acres of vireo habitat (albeit primarily low quality Arundo and grass-forb mix), and temporarily impact an additional 2.2 acres. However, some of this vegetation has been previously disturbed and contains only remnant components of the original vegetation. As such, this acreage may represent marginal vireo habitat. Both permanent and temporary impacts to vireo habitat are expected to occur during two breeding seasons (15 March through 31 August), with temporary impacts expected to occur over an additional 3 to 10 breeding seasons as the impacted areas gradually regain the vegetation characteristics of occupiable vireo

habitat. The net result of the temporarily impacted areas would be beneficial to the vireo because the current low quality habitat will be replaced with higher quality native vegetation. According to data gathered during 1995, the Santa Margarita floodplain supported 461 least Bell's vireos (comprised of nesting pairs, territorial males, and undetermined status males). Based on data gathered during 1996, the Santa Margarita floodplain supported about 492 vireos, of which there are about 287 (pairs or males) present in the area of the proposed project. Two of these 287 made use of the area subject to direct permanent or temporary impacts as a result of Bridge Alignment A construction, as shown on Figure 4.3-1.

The direct permanent disturbance to 0.9 acres of vireo habitat (consisting of 0.2 acres of Arundo, 0.6 acres of grass-forb mix, and 0.1 acre of riparian scrub), and temporary disturbance to 2.2 acres of vireo habitat (consisting of 1.4 acres of Arundo, 0.4 acre of grass-forb mix, and 0.4 acre of riparian scrub), will directly disturb a minimum of two vireos, likely through displacement. No vireos are expected to be killed outright during bridge construction activities, because vegetation clearing will be accomplished prior to the breeding season. In addition, two other vireos which are present within about 250 feet of the limits of proposed construction may be directly disturbed by noise and dust generated during construction activities. These direct impacts (consisting of loss of breeding and foraging habitat, displacement of individuals, and disturbance due to noise and dust) to breeding vireos are considered significant.

Least Bell's vireo may also be directly impacted by brush clearance activities to allow temporary increased traffic use of Rifle Range Road during bridge replacement. It is anticipated that overhanging Arundo would be trimmed back about ten feet on either side of the existing Rifle Range Road. Little, if any native trees will be trimmed. As such, this impact is adverse, but not significant.

The magnitude of these direct impacts to vireos can be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of increasing the quality of currently degraded vegetation to replace the lost vireo habitat, and avoidance of vegetation clearance during the breeding season.

Southwestern Willow Flycatcher. According to data gathered during 1995 and 1996, there are no southwestern willow flycatcher territories along the Santa Margarita River in the area of the proposed bridge replacement project, as also shown on Figure 4.3-1. As such, direct impacts to southwestern willow flycatcher are not anticipated.

Coastal California Gnatcatcher. Construction of Bridge Alignment A will not likely result in harm or harassment to coastal California gnatcatchers (gnatcatcher) present in the area of appropriate habitat subject to disturbance. In 1994, gnatcatchers were recorded in coastal sage scrub habitat along the top of the bluffs northeast of the northern end of Basilone Road Bridge.

Construction activities are expected to permanently impact up to 0.8 acre of Diegan coastal sage scrub and temporarily impact up to an additional 0.4 acre. However, some of this vegetation has been previously disturbed (particularly adjacent to the bridge) and contains only remnant coastal sage scrub components. As such, this acreage is considered to represent only marginal gnatcatcher habitat, and the amount indicated as subject to permanent or temporary loss is the maximum possible. Actual acreage disturbed is expected to be less. For this analysis, it is assumed that this habitat maybe used by the gnatcatchers in the area. Construction is expected to occur during two breeding seasons (15 February through 1 August), with temporary habitat value loss to last an additional three to five breeding seasons as the areas gradually regain the vegetation characteristics of gnatcatcher habitat. These potential direct habitat impacts would be considered significant if they resulted in mortality, harm, or harassment of gnatcatchers.

The magnitude of these potential impacts to gnatcatchers can be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of avoidance of vegetation clearance during the gnatcatcher breeding season, and replacing lost coastal sage scrub habitat. Because gnatcatchers may be affected even though construction of Bridge Alignment A will not likely result in significant disturbance to territories or habitat, informal consultation with the USFWS will occur. Because Alignment A is not expected to result in incidental take of gnatcatchers, formal consultation with the USFWS regarding potential take, harm, or harass issues for gnatcatchers should not be required for the Preferred Alternative. The informal consultation and the ability to avoid take should obviate formal consultation.

Endangered Bird Species in Area to be Permanently and Temporarily Directly Impacted

Alternative Bridge Alignment A

Species	Numbers of Pairs (or males)
Least Bell's Vireo	2
Southwestern Willow Flycatcher	0
Coastal California Gnatcatcher	Not likely affected

Alternative Bridge Alignment B

Species	Numbers of Pairs (or males)
Least Bell's Vireo	2
Southwestern Willow Flycatcher	0
Coastal California Gnatcatcher	Slightly possible

Alternative Bridge Alignment C

Species	Numbers of Pairs (or males)
Least Bell's Vireo	10
Southwestern Willow Flycatcher	0
Coastal California Gnatcatcher	Expected

Quino Checkerspot. Construction of Bridge Alignment A will not likely result in direct disturbance to Quino checkerspot butterflies. The Quino checkerspot butterfly has not been documented as occurring aboard MCB Camp Pendleton. To date (through late spring 1997), surveys have not recorded this taxon, but suitable populations of host plants have been discovered (personal communication, Environmental Security, MCB Camp Pendleton, 1997). An additional year of spring survey effort will be expended in 1998. However, based on the lack of records from the area, and the marginal nature of habitat to be disturbed, this species is no longer considered in this document.

Arroyo Toad. Construction of Bridge Alignment A may result in direct disturbance or mortality to arroyo toads. Based on data gathered during 1996, arroyo toads occur along the Santa Margarita River from the eastern boundary of the base downstream to Stuart Mesa Road Bridge. Based on an evaluation of available toad location data, it appears that bridge construction may not directly impact toad breeding pools. However, there is a potential for toad mortality by vehicle crushing in roadways and other construction areas. Without implementation of Best Management Practices, toads could be harmed from inadvertent fouling or pollution of the river water from accidental fluid spill or other construction material discharge, and increased construction-related sedimentation. For example, concreting activities that result in concrete or affected water reaching toad breeding areas could affect an entire years reproductive output within a limited area downstream of the contamination site, due to changes in the pH.

Toads may also be directly impacted by road improvement activities to allow temporary increased traffic use of Rifle Range Road during bridge replacement, as well as by the increased traffic itself. It is anticipated that overhanging Arundo would be trimmed back about ten feet on either side of the existing Rifle Range Road, and that an approximately 2,500 square foot area of open water/gravel, mud habitat would be disturbed during installation of culverts. Increased numbers of vehicles on this road might increase direct mortality of individual toads.

These direct impacts to toad populations (through crushing and loss of larvae due to pollution and sedimentation) are considered significant.

The magnitude of these direct impacts to arroyo toads would be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3,

consisting primarily of avoidance of construction activities during the toad breeding season (as practicable), the use of biological construction monitors to remove toads from harm's way in construction areas, and the use of Best Management Practices to minimize the amount of construction-related sedimentation and the potential for fouling or pollution.

Federal Species of Concern. Construction of Bridge Alignment A may result in direct disturbance to one or more federal wildlife species of concern. This direct disturbance to most species is considered an adverse impact that is not significant due to the relative abundance and low sensitivity status of most federal species of concern. However, disturbance to roosting federal bat species of concern as a result of demolition of the existing Basilone Road Bridge would be a significant impact. The Yuma myotis is known to roost under bridges along the Santa Margarita River, and may roost under the existing Basilone Road Bridge. The magnitude of this disturbance impact to roosting federal bat species of concern can be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting of surveying for roosting Yuma myotis prior to bridge demolition and application of active exclusion practices if bats are present.

Indirect Impacts to General Wildlife - Bridge Alignment A.

Construction of Bridge Alignment A will improve the hydrology of the Basilone Road Bridge area of the Santa Margarita River (as discussed below), and will result in a healthier riverine system in the immediate vicinity of the bridge. As such, general wildlife species are expected to benefit. Due to the increased height of the bridge and increased distance between the concrete footings, the proposed replacement bridge will likely represent less of a constraint to wildlife using the river as a movement corridor than the current bridge. The standard traffic light planned for the new bridge will not increase light and glare, and as such would not cause indirect impacts to the general wildlife species in the area.

Indirect Impacts to Sensitive Wildlife - Bridge Alignment A.

Least Bell's Vireo. Construction of Bridge Alignment A will improve the hydrology of the Basilone Road Bridge area of the Santa Margarita River. Under current conditions, the bridge's alignment and position create a bottleneck for water which has resulted in increased sediment levels upstream. Habitat destructive desiltation activities have been required upstream of the bridge, which have likely encouraged the spread of the invasive Arundo and resulted in relatively low habitat values for vireos. Construction of Bridge Alignment A would obviate these desiltation activities, and will allow the development of higher value vireo habitat.

Least Bell's vireo and southwestern willow flycatcher may be indirectly impacted by the temporary increased traffic use of Rifle Range Road during bridge replacement. Increased traffic will increase exposure to birds along the road to levels of noise and glare from headlights at night.

Coastal California Gnatcatcher. Construction of Bridge Alignment A will not increase levels of traffic or noise. The standard traffic light planned for the new bridge would not increase light and glare, and as such will not cause indirect impacts to gnatcatchers, if present on top of the bluffs.

Arroyo Toad. Construction of Bridge Alignment A will improve the hydrology of the Basilone Road Bridge area of the Santa Margarita River. Under current conditions, the bridge's alignment and position create a bottleneck for water which has resulted in increased sediment levels upstream. Habitat destructive desiltation activities have been required upstream of the bridge, which have likely impacted arroyo toads. Construction of Bridge Alignment A would obviate these desiltation activities, and would allow the development of higher value toad habitat. There may be a related slight increase in sedimentation rates just downstream of the bridge, but the improved habitat quality upstream will likely exceed any negative effects the bridge construction may cause downstream. Construction of Bridge Alignment A is not expected to result in a significant indirect impact to arroyo toads, and may represent a slight beneficial impact in the immediate vicinity of the bridge. Removal of movement barriers and creation of a wider floodplain are also considered a slight beneficial impact (personal communication, Environmental Security, MCB Camp Pendleton, 1997).

4.3.2.2 Alternative 3B [Levee Alignment 3 + Bridge Alignment B]

The relationship between the infrastructure components of Alternative 3B and the existing biological resources is shown on Figure 4.3-2. Construction of Levee Alignment 3 would permanently disturb 24.3 acres (including eliminating 13.1 acres of habitat and 'disturbing' 11.2 acres of currently disturbed/developed areas) and the associated construction corridor would temporarily disturb 38.4 acres (28.6 acres of habitat, 9.8 acres of disturbed/developed).

The stormwater management system includes a pump house on 0.7 acres in the levee footprint.

Approaches and bents of Bridge Alignment B would permanently disturb 5.5 acres (3.5 acres of habitat, 2.0 acres of disturbed/developed) and temporarily disturb 5.6 acres (3.4 acres of habitat, 2.2 acres of disturbed/developed).

The combined direct impacts to vegetation and habitat which would be affected by Alternative 3B are summarized in Table 4.3.4-2. Construction would permanently cover 13.2 acres of disturbed/developed areas, and an additional 12.0 acres of disturbed/developed lands would be

temporarily used during construction. These direct 'impacts' to previously disturbed areas total 25.2 acres and are not considered significant. Impacts to all other vegetation and habitat types are considered significant. Permanent significant direct impacts total 16.6 acres. Temporary significant direct impacts total 32.0 acres. Therefore, the total significant direct impacts resulting from the construction of Alternative 3B would be 48.6 acres. Each of the components of Alternative 3B are discussed below.

Levee Alignment 3. Impacts to biological resources resulting from the construction of Levee Alignment 3 would be the same as those for Alternative 3A.

Stormwater Management System. Impacts to biological resources resulting from the implementation of the Stormwater Management System associated with Alternative 3B would be the same as those for Alternative 3A.

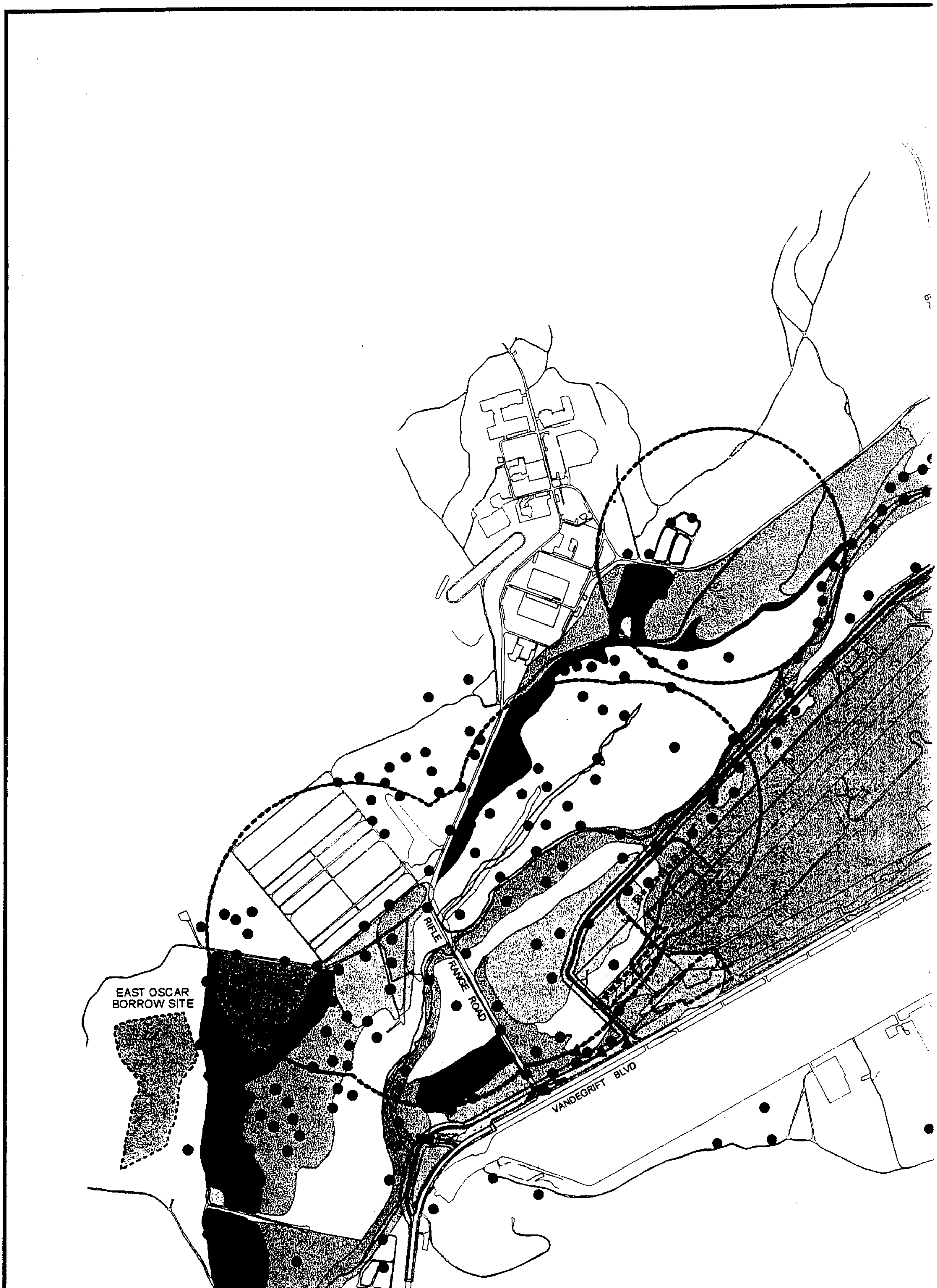
Bridge Alignment B-East Curve Alignment

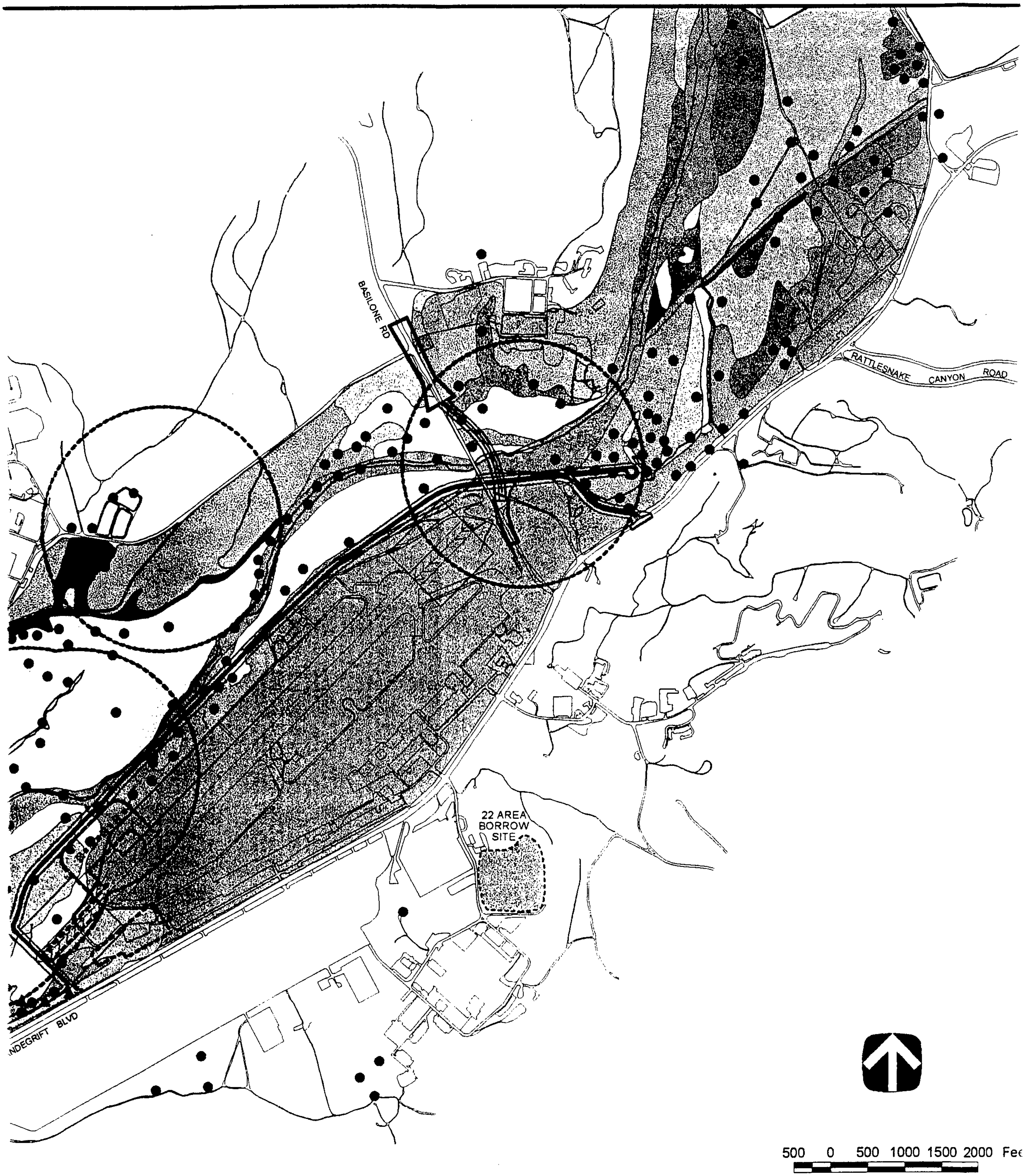
Vegetation. The construction of Bridge Alignment B would have significant impacts to vegetation occurring in the proposed project area. The total permanent and temporary direct impacts resulting from the implementation of the alternative bridge alignments are included in Appendix D.

Direct Impacts to Vegetation - Bridge Alignment B - East Curve Alignment.

Implementation of Bridge Alignment B would adversely affect a total of 11.1 acres. This would include 5.5 acres of permanent impact (3.5 acres of habitat, 2.0 acres of disturbed/developed) and 5.6 acres of temporary impacts (3.4 acres of habitat, 2.2 acres of disturbed/developed). Some of this acreage has been previously disturbed in association with bridge construction, and contains only remnant components of the original vegetation.

Permanent Impacts. Permanent impacts to vegetation associated with the construction of Bridge Alignment B would occur primarily from grading, construction of the roadway approaches and placement of the piers. Of the total area which would be permanently affected, about 1.9 acres, are considered to represent significant impacts. Construction of the Bridge Alignment B would result in the permanent loss of up to 1.2 acres of vegetation characterized as Diegan coastal sage scrub. However, some of this vegetation has been previously disturbed and contains only remnant coastal sage scrub components. This acreage is considered to represent the maximum amount of coastal sage scrub subject to disturbance. Actual acreage disturbed is expected to be less. The permanent loss of up to 1.2 acres of Diegan coastal sage scrub represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.


EAST OSCAR
BORROW SITE
RIFLE RANGE ROAD
VANDEGRIFT BLVD


BASILONE RD
RATTLESNAKE CANYON ROAD
22 AREA
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NDEGRIFT BLVD
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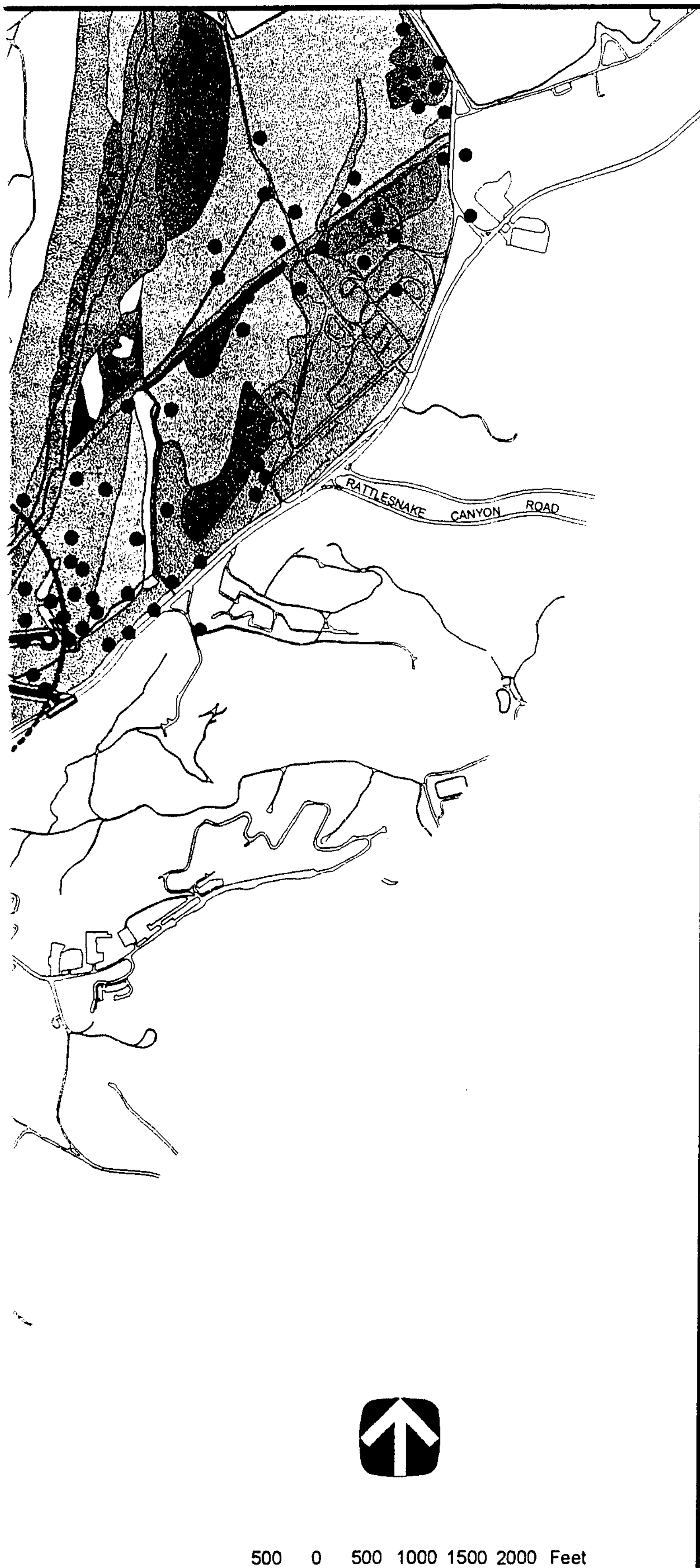


Construction Alternatives
Permanent Footprint
Construction Corridor

Basemap Features
Hydrology Features
Roads, Parking, Airfield
Borrow Site
BRAC Projects

Habitat Categories
Arundo
Diegan Coastal Sage Scrub
Disturbed
Freshwater Marsh
Grass Forb Mix
Mixed Willow Exotic
Riparian Scrub
Riparian Woodland
Tamarisk
Water Gravel Mud

Species
Southwestern Flycatcher
Least Bell's Vireo
Arroyo Southwestern Toad (500M Buffer)

Alternative 3B
Habitat Impact and
Sensitive Species

Figure 4.3 - 2

Construction of the Bridge Alignment B would result in the permanent loss of 0.5 acres of riparian scrub vegetation. The permanent loss of 0.5 acres of riparian scrub represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.

Construction of the Bridge Alignment B would result in the permanent loss of 0.2 acres of open water/gravel, mud habitat. The permanent loss of 0.2 acres of open water/gravel, mud represent a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.

In addition to these significant impacts, the construction of Bridge Alignment B would result in the permanent loss of Arundo, grass-forb mix, and disturbed/developed lands (as shown in Appendix D). These vegetation types are not considered sensitive, and their loss does not represent a significant impact.

Temporary Impacts. Temporary impacts to vegetation associated with the construction of Bridge Alignment B would occur primarily from vegetation removal, grading, access for and the use of heavy machinery within the construction corridor. Upon completion of construction, the temporarily affected area would be restored to the original vegetation/habitat type where appropriate, in a manner consistent with the USFWS programatic riparian and estuarine Biological Opinion and MCB Camp Pendleton conservation plan. Areas characterized by existing habitat dominated by invasive exotics would be restored to appropriate native plant communities. Revegetation following temporary impacts of low quality vegetation will result in a net benefit to the ecosystem. Of the total area temporarily affected by the proposed project, 3.4 acres are considered to represent significant impacts, as detailed below.

Construction of the Bridge Alignment B would result in the temporary loss of 0.5 acres of Diegan coastal sage scrub vegetation. However, some of this vegetation has been previously disturbed and contains only remnant coastal sage scrub components. As such, this acreage is considered to represent the maximum amount of coastal sage scrub subject to temporary disturbance. Actual acreage disturbed is expected to be less. The temporary disturbance to up to 0.5 acres of Diegan coastal sage scrub represents a significant impact. The magnitude of this direct impact to coastal sage scrub vegetation can be reduced to a level that is not significant.

Construction of the Bridge Alignment B would result in the temporary loss of 0.5 acres of riparian scrub vegetation. However, some of this vegetation has been previously disturbed and contains only remnant riparian scrub components. This acreage is considered to represent the maximum amount of riparian scrub subject to temporary disturbance. Actual acreage temporarily disturbed is expected to be less. The temporary loss of 0.5 acres of riparian scrub represents a significant impact. The

magnitude of this direct impact to riparian scrub vegetation can be reduced to a level that is not significant.

Construction of the Bridge Alignment B would result in the temporary loss of 0.5 acres of open water/gravel, mud habitat. The temporary loss of 0.5 acres of open water/gravel, mud represents a significant impact. The magnitude of this direct impact to open water/gravel, mud can be reduced to a level that is not significant.

In addition to these significant impacts, the construction of Bridge Alignment B would result in the temporary use of areas currently supporting Arundo and grass-forb mix, as well as disturbed/developed lands (as shown in Appendix D). The first two vegetation types are not considered sensitive and this temporary use does not represent a significant adverse impact. In fact, temporary disturbance to areas supporting invasive exotic species such as Arundo, and replacement with appropriate native vegetation represents a beneficial impact of the project. There would be no temporary impact to currently disturbed/developed areas (by definition).

Wildlife and Sensitive Species. Both direct and indirect impacts to wildlife resources within and adjacent to the Santa Margarita River will occur as a result of construction of the proposed bridge replacement project. Direct impacts involve the permanent and temporary removal of wildlife and habitat as a result of bridge construction, as well as increased sedimentation, noise, and dust during construction activities. Indirect impacts include changes within the river which may alter the physical characteristics of occupied or occupiable habitat such that it may no longer be capable of supporting sensitive species. Similarly, because the Santa Margarita River is a dynamic system, these changes within the river may alter the physical characteristics of currently unoccupied or unoccupiable habitat in other areas such that it may be capable of supporting sensitive species in the future. In addition, noise associated with bridge operation may cause indirect impacts.

Direct Impacts to General Wildlife - Bridge Alignment B.

Construction of Bridge Alignment B would result in direct impacts to wildlife present within the habitats subject to disturbance. These direct impacts are expected to be similar to those described previously for Bridge Alignment A. However, construction of Bridge Alignment B would result in additional acreage subject to permanent and temporary disturbance, and increased impacts to general wildlife species relative to Bridge Alignment A.

Direct Impacts to Sensitive Wildlife - Bridge Alignment B.

Least Bell's Vireo. Construction of Bridge Alignment B would result in the direct loss of occupied or occupiable breeding and foraging habitat of the least Bell's vireo. Construction

activities are expected to permanently impact 2.1 acres of vireo habitat, and temporarily impact an additional 4.5 acres. However, some of this vegetation has been previously disturbed and contains only remnant components of the original vegetation. As such, this acreage may represent marginal vireo habitat. Both permanent and temporary impacts to vireo habitat are expected to occur during two breeding seasons (15 March through 31 August), with temporary impacts expected to occur over an additional three to ten breeding seasons as the impacted areas gradually regain the vegetation characteristics of occupiable vireo habitat. The net result of the temporarily impacted areas will be beneficial to the vireo because the current low quality habitat will be replaced with higher quality native vegetation. According to data gathered during 1995, the Santa Margarita floodplain supported 461 least Bell's vireos (comprised of nesting pairs, territorial males, and undetermined status males). Based on data gathered during 1996, the Santa Margarita floodplain supported about 492 vireos, of which there are about 287 (pairs or males) present in the area of the proposed project. Two of these 287 made use of the area subject to direct permanent or temporary impacts as a result of Bridge Alignment B construction, as shown on Figure 4.3-2.

The direct permanent disturbance to 2.1 acres of vireo habitat (consisting of 0.9 acres of Arundo, 0.6 acres of grass-forb mix, 0.1 acres of mixed willow exotic, and 0.5 acres of riparian scrub), and temporary disturbance to 2.4 acres of vireo habitat (consisting of 1.4 acres of Arundo, 0.4 acre of grass-forb mix, 0.1 acre of mixed willow exotic, and 0.5 acre of riparian scrub), will directly disturb a minimum of two vireos, likely through displacement. No vireos are expected to be killed outright during bridge construction activities, because vegetation clearing would be accomplished prior to the breeding season. In addition, four other vireos which are present within about 250 feet of the limits of proposed construction may be directly disturbed by noise and dust generated during construction activities. These direct impacts (consisting of loss of breeding and foraging habitat, displacement of individuals, and disturbance due to noise and dust) to breeding vireos are considered significant.

The magnitude of these direct impacts to vireos can be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of increasing the quality of currently degraded vegetation to replace the lost vireo habitat, and avoidance of vegetation clearance during the breeding season.

Southwestern Willow Flycatcher. According to data gathered during 1995 and 1996, there are no southwestern willow flycatcher territories along the Santa Margarita River in the area of the proposed bridge replacement project, as also shown on Figure 4.3-2. As such, direct impacts to southwestern willow flycatcher are not anticipated.

Coastal California Gnatcatcher. Construction of Bridge Alignment B may result in direct disturbance to coastal California gnatcatchers (gnatcatcher), if present in the areas of appropriate

habitat subject to disturbance. In 1996, gnatcatchers were recorded in coastal sage scrub habitat along the top of the bluffs northeast of the northern end of Basilone Road Bridge. Construction activities are expected to permanently impact 1.2 acres of coastal sage scrub, and temporarily impact an additional 0.5 acres. However, some of this vegetation has been previously disturbed (particularly adjacent to the bridge) and contains only remnant coastal sage scrub components. This acreage is considered to represent marginal potential gnatcatcher habitat, and the amount indicated as subject to disturbance is the maximum possible. Actual acreage disturbed is expected to be less. For this analysis, it is assumed that this habitat is occupied or occupiable because of the presence of gnatcatcher in the area. Both permanent and temporary impacts to gnatcatcher habitat are expected to occur during two breeding seasons (15 February through 1 August), with temporary impacts expected to occur over an additional three to five breeding seasons as the impacted areas gradually regain the vegetation characteristics of occupiable gnatcatcher habitat. These potential direct impacts (consisting of loss of occupiable breeding and foraging habitat, potential displacement of individuals, and potential disturbance due to noise and dust) to breeding gnatcatchers (if present) are considered significant.

The magnitude of these direct impacts to gnatcatchers can be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of avoidance of vegetation clearance during the gnatcatcher breeding season, and replacing lost coastal sage scrub habitat. Because impacts may occur to gnatcatchers, and construction of Bridge Alignment B may potentially result in disturbance to territories or occupied habitat, informal consultation with the USFWS could be scheduled should this alternative be constructed. Formal consultation with the USFWS regarding potential take, harm or harass issues for gnatcatchers may likely not be required for this alternative due to the informal consultation and the likely ability to avoid take.

Arroyo Toad. Construction of Bridge Alignment B may result in direct impacts to arroyo toad populations which are similar to those described previously for Bridge Alignment A. However, construction of Bridge Alignment B would result in additional acreage subject to permanent and temporary disturbance, and would increase the potential for direct impacts to arroyo toad populations relative to Bridge Alignment A.

Federal Species of Concern. Construction of Bridge Alignment B may result in direct disturbance to one or more federal wildlife species of concern which are similar to those described previously for Bridge Alignment A. However, construction of Bridge Alignment B would result in additional acreage subject to permanent and temporary disturbance, and would increase the potential for direct impacts to federal species of concern relative to Bridge Alignment A.

Indirect Impacts to General and Sensitive Wildlife - Bridge Alignment B.

The indirect impacts to general wildlife and sensitive wildlife species as a result of construction of Bridge Alignment B are expected to be similar to those described previously for Bridge Alignment A.

4.3.2.3 Alternative 3C [Levee Alignment 3 + Bridge Alignment C] - Rattlesnake Canyon Road Alignment

The relationship between the infrastructure components of Alternative 3C and the existing biological resources is shown on Figure 4.3-3. Construction of Levee Alignment 3 would permanently disturb 24.3 acres (including eliminating 13.1 acres of habitat and 'disturbing' 11.2 acres of currently disturbed/developed areas) and the associated construction corridor would temporarily disturb 38.4 acres (28.6 acres of habitat, 9.8 acres of disturbed/developed).

The stormwater management system includes a pump house on 0.7 acres within the levee footprint.

Approaches and bents of Bridge Alignment C would permanently disturb 7.6 acres (5.2 acres of habitat, 2.4 acres of disturbed/developed) and temporarily disturb 9.6 acres (7.2 acres of habitat, 2.4 acres of disturbed/developed).

The combined direct impacts to vegetation and habitat which would be affected by Alternative 3C are summarized in Table 4.3.4-3. Construction would permanently cover 13.6 acres of disturbed/developed areas, and an additional 12.2 acres of disturbed/developed lands would be temporarily used during construction. These direct 'impacts' to previously disturbed areas total 25.8 acres and are not considered significant. Impacts to all other vegetation and habitat types are considered significant. Permanent significant direct impacts total 18.3 acres. Temporary significant direct impacts total 35.8 acres. Therefore, the total significant direct impact resulting from the construction of Alternative 3C would be 54.1 acres. Each of the components of Alternative 3C are discussed below.

Levee Alignment 3. Impacts to biological resources resulting from the construction of Levee Alignment 3 are described under Alternative 3A in this section.

Stormwater Management System. Impacts to biological resources resulting from the implementation of the Stormwater Management System associated with Alternative 3C are described under Alternative 3A in this section.

Bridge Alignment C - Rattlesnake Canyon Bridge Alignment

Vegetation. The construction of Bridge Alignment C would have significant impacts to vegetation occurring in the proposed project area. The total permanent and temporary direct impacts resulting from the implementation of the alternative bridge alignments are included in Appendix D.

Direct Impacts to Vegetation - Bridge Alignment C-Rattlesnake Canyon Bridge Alignment.

Implementation of Bridge Alignment C would adversely affect a total of 17.2 acres. This would include 7.6 acres of permanent impact and 9.6 acres of temporary impacts. Some of this acreage has been previously disturbed in association with bridge construction, and contains only remnant components of the original vegetation.

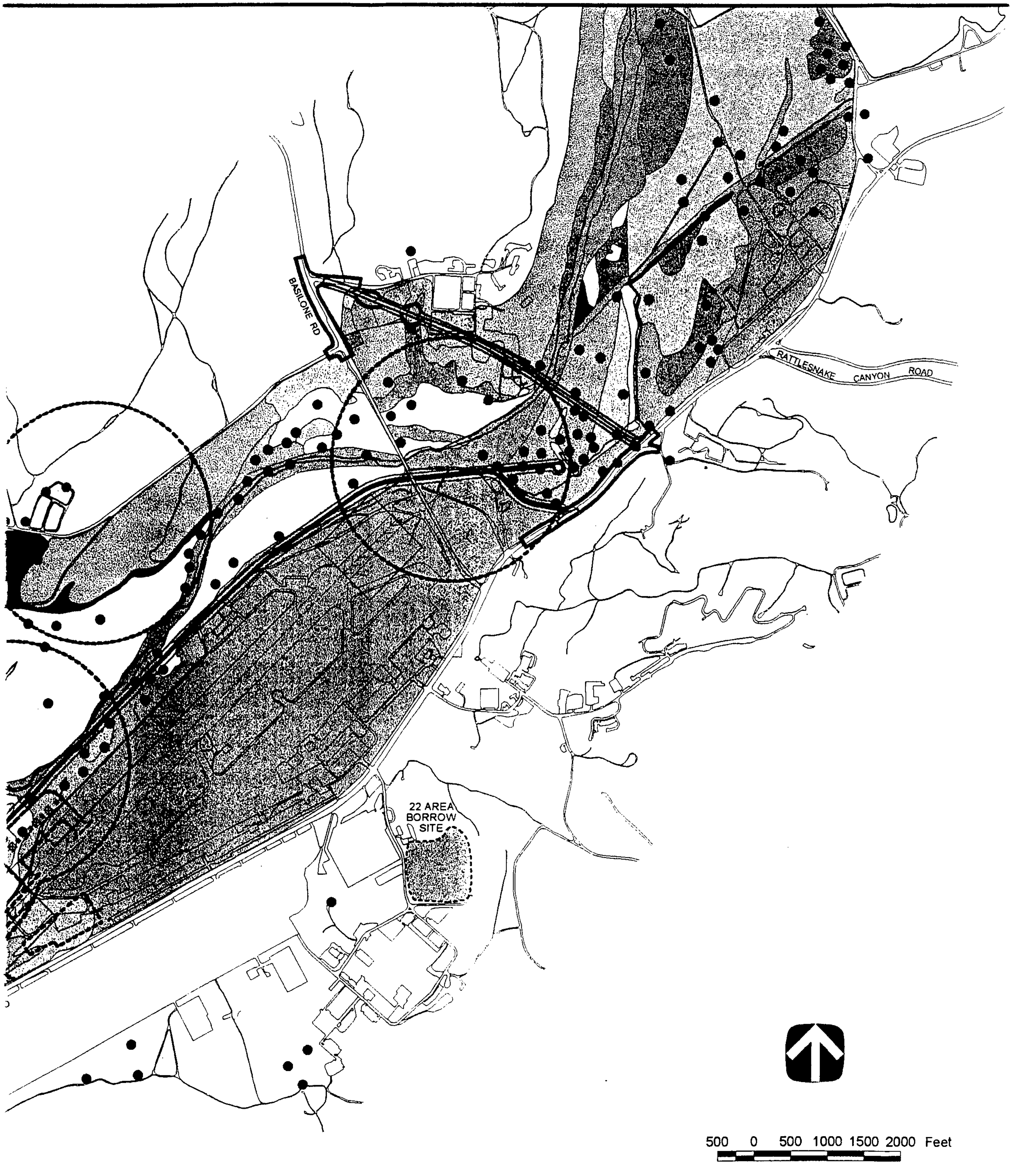
Permanent Impacts. Permanent impacts to vegetation associated with the construction of Bridge Alignment C would occur primarily from grading, construction of the roadway approaches and placement of the piers. Of the total area permanently affected, up to 5.2 acres are considered to represent significant impacts, as detailed below.

Construction of Bridge Alignment C would result in the permanent loss of up to 2.3 acres of vegetation characterized as Diegan coastal sage scrub. However, some of this vegetation has been previously disturbed and contains only remnant coastal sage scrub components. As such, this acreage is considered to represent the maximum amount of coastal sage scrub subject to permanent disturbance. Actual acreage disturbed is expected to be less. The permanent disturbance of up to 2.3 acres of Diegan coastal sage scrub represents a significant impact. The magnitude of this direct impact to coastal sage scrub vegetation can be reduced to a level that is not significant.

Construction of Bridge Alignment C would result in the permanent loss of 0.8 acre of riparian scrub vegetation. However, some of this vegetation has been previously disturbed and contains only remnant riparian scrub components. As such, this acreage is considered to represent the maximum amount of riparian scrub subject to permanent disturbance. Actual acreage disturbed is expected to be less. The permanent loss of 0.8 acre of riparian scrub represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.

Construction of Bridge Alignment C would result in the permanent loss of 1.0 acre of mixed willow exotic vegetation. The permanent loss of 1.0 acre of mixed willow exotic represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.


EAST OSCAR
BORROW SITE
RIFLE RANGE ROAD
VANDEGRIFT BLVD
BASILONE


BASILONE RD
RATTLESNAKE CANYON ROAD
22 AREA
BORROW
SITE
500 0 500 1000 1500 2000 Feet

Construction Alternatives
- Permanent Footprint
- Construction Corridor

Basemap Features
- Hydrology Features
- Roads, Parking, Airfield
- Borrow Site
- BRAC Projects

Habitat Categories
- Arundo
- Diegan Coastal Sage Scrub
- Disturbed
- Freshwater Marsh
- Grass Forb Mix
- Mixed Willow Exotic
- Riparian Scrub
- Riparian Woodland
- Tamarisk
- Water Gravel Mud

Species
- Southwestern Flycatcher
- Least Bell's Vireo
- Arroyo Southwestern Toad (500M Buffer)

Alternative 3C Habitat Impact and Sensitive Species

Figure 4.3 - 3

Construction of Bridge Alignment C would result in the permanent loss of 0.2 acre of open water/gravel, mud habitat. The permanent loss of 0.2 acre of open water/gravel, mud represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.

In addition to these significant impacts, the construction of Bridge Alignment C would result in the permanent loss of grass-forb mix and disturbed/developed lands (as shown in Appendix D). These vegetation types are not considered sensitive, and their loss does not represent a significant impact.

Temporary Impacts. Temporary impacts to vegetation associated with the construction of Bridge Alignment C would occur primarily from vegetation removal, grading, access for and the use of heavy machinery within the construction corridor. Upon completion of construction, the temporarily affected area would be restored to the original vegetation/habitat type where appropriate, in accordance with the USFWS programatic riparian and estuarine Biological Opinion and MCB Camp Pendleton conservation plan. Areas characterized by existing habitat dominated by invasive exotics would be restored to appropriate native plant communities. Revegetation following temporary impacts of low quality vegetation will result in a net benefit to the ecosystem. Of the total area temporarily affected by the proposed project, 7.2 acres are considered to represent significant impacts.

Construction of Bridge Alignment C would result in the temporary loss of 2.4 acres of Diegan coastal sage scrub vegetation. However, some of this vegetation has been previously disturbed and contains only remnant coastal sage scrub components. As such, this acreage is considered to represent the maximum amount of coastal sage scrub subject to temporary disturbance. Actual acreage disturbed is expected to be less. The temporary disturbance to up to 2.4 acres of Diegan coastal sage scrub represents a significant impact. The magnitude of this direct impact to coastal sage scrub vegetation can be reduced to a level that is not significant.

Construction of Bridge Alignment C would result in the temporary loss of 0.4 acre of riparian scrub vegetation. However, some of this vegetation has been previously disturbed and contains only remnant riparian scrub components. As such, this acreage is considered to represent the maximum amount of riparian scrub subject to temporary disturbance. Actual acreage temporarily disturbed is expected to be less. The temporary loss of 0.4 acres of riparian scrub represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.

Construction of Bridge Alignment C would result in the temporary loss of 2.5 acres of mixed willow exotic vegetation. The temporary loss of 2.5 acres of mixed willow exotic represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.

Construction of Bridge Alignment C would result in the temporary loss of 0.6 acre of open water/gravel, mud habitat. The temporary loss of 0.6 acre of open water/gravel, mud represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.

In addition to these significant impacts, the construction of Bridge Alignment C would result in the temporary use of areas currently supporting grass-forb mix vegetation, as well as disturbed/developed lands (as shown in Appendix D). The grass-forb mix vegetation is not considered sensitive and this temporary use does not represent a significant adverse impact. In fact, temporary disturbance to areas supporting grass-forb mix vegetation, and replacement with appropriate native riparian vegetation represents a beneficial impact of the project. There would be no temporary impact to currently disturbed/developed areas.

Wildlife and Sensitive Species. Both direct and indirect impacts to wildlife resources within and adjacent to the Santa Margarita River will occur as a result of construction of the proposed bridge replacement project. Direct impacts involve the permanent and temporary removal of wildlife and habitat as a result of bridge construction, as well as increased sedimentation, noise, and dust during construction activities. Indirect impacts include changes within the river which may alter the physical characteristics of occupied or occupiable habitat such that it may no longer be capable of supporting sensitive species. Similarly, because the Santa Margarita River is a dynamic system, these changes within the river may alter the physical characteristics of currently unoccupied or unoccupiable habitat in other areas such that it may be capable of supporting sensitive species in the future. In addition, noise and lighting associated with bridge operation may cause indirect impacts.

Direct Impacts to General Wildlife - Bridge Alignment C.

Construction of Bridge Alignment C would result in direct impacts to wildlife present within the habitats subject to disturbance. These direct impacts are expected to be similar to those described previously for Bridge Alignment A and B. However, construction of Bridge Alignment C would result in additional acreage subject to permanent and temporary disturbance, and increased impacts to general wildlife species relative to Bridge Alignment A and Bridge Alignment B.

Direct Impacts to Sensitive Wildlife - Bridge Alignment C.

Least Bell's Vireo. Construction of Bridge Alignment C would result in the direct loss of occupied or occupiable breeding and foraging habitat of the least Bell's vireo. Construction activities are expected to permanently impact 2.7 acres of vireo habitat, and temporarily impact an additional 4.2 acres. However, some of this vegetation has been previously disturbed and contains only remnant components of the original vegetation. As such, some of this acreage may represent

marginal vireo habitat. Both permanent and temporary impacts to vireo habitat are expected to occur during two breeding seasons (15 March through 31 August), with temporary impacts expected to occur over an additional three to ten breeding seasons as the impacted areas gradually regain the vegetation characteristics of occupiable vireo habitat. The net result of the temporarily impacted areas will be beneficial to the vireo because the current low quality habitat will be replaced with higher quality native vegetation. According to data gathered during 1995, the Santa Margarita floodplain supported 461 least Bell's vireos (comprised of nesting pairs, territorial males, and undetermined status males). Based on data gathered during 1996, the Santa Margarita floodplain supported about 492 vireos, of which there are about 287 (pairs or males) present in the area of the proposed project. Ten of these 287 made use of the area subject to direct permanent or temporary impacts as a result of Bridge Alignment C construction, as shown on Figure 4.3-3.

The direct permanent disturbance to 2.7 acres of vireo habitat (consisting of 0.8 acres of riparian scrub, 1.0 acre of mixed willow exotic, and 0.9 acre of grass-forb mix), and temporary disturbance to 4.2 acres of vireo habitat (consisting of 0.4 acres of riparian scrub, 2.5 acres of mixed willow exotic, and 1.3 acres of grass-forb mix), would directly disturb a minimum of 10 vireos, likely through displacement. No vireos are expected to be killed outright during bridge construction activities, because vegetation clearing would be accomplished prior to the breeding season. In addition, five other vireos which are present within about 250 feet of the limits of proposed construction may be directly disturbed by noise and dust generated during construction activities. These direct impacts (consisting of loss of breeding and foraging habitat, displacement of individuals, and disturbance due to noise and dust) to breeding vireos are considered significant.

The magnitude of these direct impacts to vireos can be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of increasing the quality of currently degraded vegetation to replace the lost vireo habitat, and avoidance of vegetation clearance during the breeding season.

Southwestern Willow Flycatcher. According to data gathered during 1995 and 1996, there are no southwestern willow flycatcher territories along the Santa Margarita River in the area of the proposed bridge replacement project, as also shown on Figure 4.3-3. As such, direct impacts to southwestern willow flycatcher are not anticipated.

Coastal California Gnatcatcher. Construction of Bridge Alignment C would likely result in direct disturbance to coastal California gnatcatchers. In 1996, gnatcatchers were recorded in coastal sage scrub habitat along the top of the bluffs northeast of the northern end of Basilone Road Bridge. Construction activities associated with Bridge Alignment C would be expected to permanently impact 2.3 acres of occupied coastal sage scrub habitat, and temporarily impact an additional 2.4 acres. Both permanent and temporary impacts to gnatcatcher habitat would be expected to occur

during two gnatcatcher breeding seasons (15 February through 1 August), with temporary impacts expected to occur over an additional three to five breeding seasons as the impacted areas gradually regain the vegetation characteristics of occupiable gnatcatcher habitat. These direct impacts (consisting of loss of occupied breeding and foraging habitat, displacement of individuals, and disturbance due to noise and dust) to breeding gnatcatchers would be considered significant.

The magnitude of these direct impacts to gnatcatchers could be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of avoidance of vegetation clearance during the gnatcatcher breeding season, and replacing lost coastal sage scrub habitat. Because impacts would likely occur to gnatcatchers, and construction of Bridge Alignment C would likely result in disturbance to territories or occupied habitat, formal consultation with the USFWS regarding potential take, harm or harass issues for gnatcatchers would likely be required for this alternative due to the likely inability to avoid take.

Arroyo Toad. Construction of Bridge Alignment C is expected to result in direct impacts to arroyo toad populations which are similar to those described previously for Bridge Alignment A and B. However, construction of Bridge Alignment C would result in additional acreage subject to permanent and temporary disturbance, and would increase the potential for direct impacts to arroyo toad populations relative to Bridge Alignment A and Bridge Alignment B.

Federal Species of Concern. Construction of Bridge Alignment C may result in direct disturbance to one or more federal wildlife species of concern which are similar to those described previously for Bridge Alignment A and B. However, construction of Bridge Alignment C would result in additional acreage subject to permanent and temporary disturbance, and would increase the potential for direct impacts to federal species of concern relative to Bridge Alignment A and B.

Indirect Impacts to General and Sensitive Wildlife - Bridge Alignment C

The indirect impacts to general and sensitive wildlife species as a result of construction of Bridge Alignment C are expected to be similar to those described previously for Bridge Alignment A and B.

4.3.2.4 Alternative 1A [Levee Alignment 1 + Bridge Alignment A]

The relationship between the infrastructure components of Alternative 1A and the existing biological resources is shown on Figure 4.3.4. Construction of Levee Alignment 1 would permanently disturb 48.9 acres (including eliminating 35.5 acres of habitat and 'disturbing' 13.4 acres of currently disturbed/developed areas) and the associated construction corridor would temporarily disturb 50.2 acres (38.5 acres of habitat, 11.7 acres of disturbed/developed), while construction of the spur dikes would permanently disturb 9.4 acres of habitat, and temporarily disturb 7.2 acres of habitat.

The stormwater management system includes a pump house on 0.7 acres within the levee footprint.

The approaches and bents of Bridge Alignment A would permanently disturb 4.2 acres (1.7 acres of habitat, 2.5 acres of disturbed/developed) and temporarily disturb 4.7 acres (2.9 acres of habitat, 1.8 acres of disturbed/developed).

The combined direct impacts to vegetation and habitat affected by Alternative 1A are summarized in Table 4.3.4-4. Construction would permanently cover 15.9 acres of disturbed/developed areas, and an additional 13.7 acres of disturbed/developed lands would be temporarily used during construction. These direct 'impacts' to previously disturbed areas total 29.6 acres and are not considered significant. Impacts to all other vegetation and habitat types are considered significant. Permanent significant direct impacts total 71.4 acres. Temporary significant direct impacts total 48.6 acres. Therefore, the total significant direct impacts resulting from the construction of Alternative 1A would be 120.0 acres. Each of the components of Alternative 1A are discussed below.

Levee Alignment 1

Vegetation. The construction of Levee Alignment 1 would result in significant impacts to vegetation. The impact acreage is provided in Appendix D. In certain cases, impacts to vegetation may not be considered significant based upon its intrinsic biological value (for example, vegetation dominated by exotic species), but the impacts may be considered important relative to endangered species conservation due to the potential to restore higher quality habitat.

Direct Impacts to Vegetation -Levee Alignment 1.

Implementation of Levee Alignment 1 would directly affect a total of 99.1 acres. This includes 48.9 acres of permanent impact (including eliminating 35.5 acres of habitat and 'disturbing' 13.4 acres of currently disturbed/developed areas) and the associated construction corridor would temporarily disturb 50.2 acres (38.5 acres of habitat, 11.7 acres of disturbed/developed).

The direct impacts to vegetation types associated with the construction of the levee would occur primarily from vegetation removal, grading and placement of the earth and concrete levee materials. Permanent habitat loss would occur within the levee footprint. Of the total area permanently affected, 19.2 acres are considered to represent significant impacts relative to vegetation, as detailed below.

- Construction of Levee Alignment 1 would result in the permanent loss of 0.3 acre of freshwater marsh. The permanent loss of 0.3 acre of freshwater marsh represents a significant impact that can be mitigated to a level that is not significant.

- Construction of Levee Alignment 1 would result in the permanent loss of 13.1 acres of mixed willow exotic. The permanent loss of 13.1 acres of mixed willow exotic represents a significant impact that can be mitigated to a level that is not significant.

- Construction of Levee Alignment 1 would result in the permanent loss of 0.5 acre of riparian scrub. The permanent loss of 0.5 acre of riparian scrub represents a significant impact that can be mitigated to a level that is not significant.

- Construction of Levee Alignment 1 would result in the permanent loss of 0.8 acre of riparian woodland. The permanent loss of 0.8 acre of riparian woodland represents a significant impact that can be mitigated to a level that is not significant.

- Construction of Levee Alignment 1 would result in the permanent loss of 4.5 acres of open water/gravel, mud. The permanent loss of 4.5 acres of open water/gravel, mud represents a significant impact that can be mitigated to a level that is not significant.

In addition to these significant impacts, the construction of Levee Alignment 1 would result in the permanent loss of Arundo, disturbed/developed lands, and grass-forb mix (as shown in Appendix D). These vegetation types are not considered sensitive and their loss does not represent a significant impact.

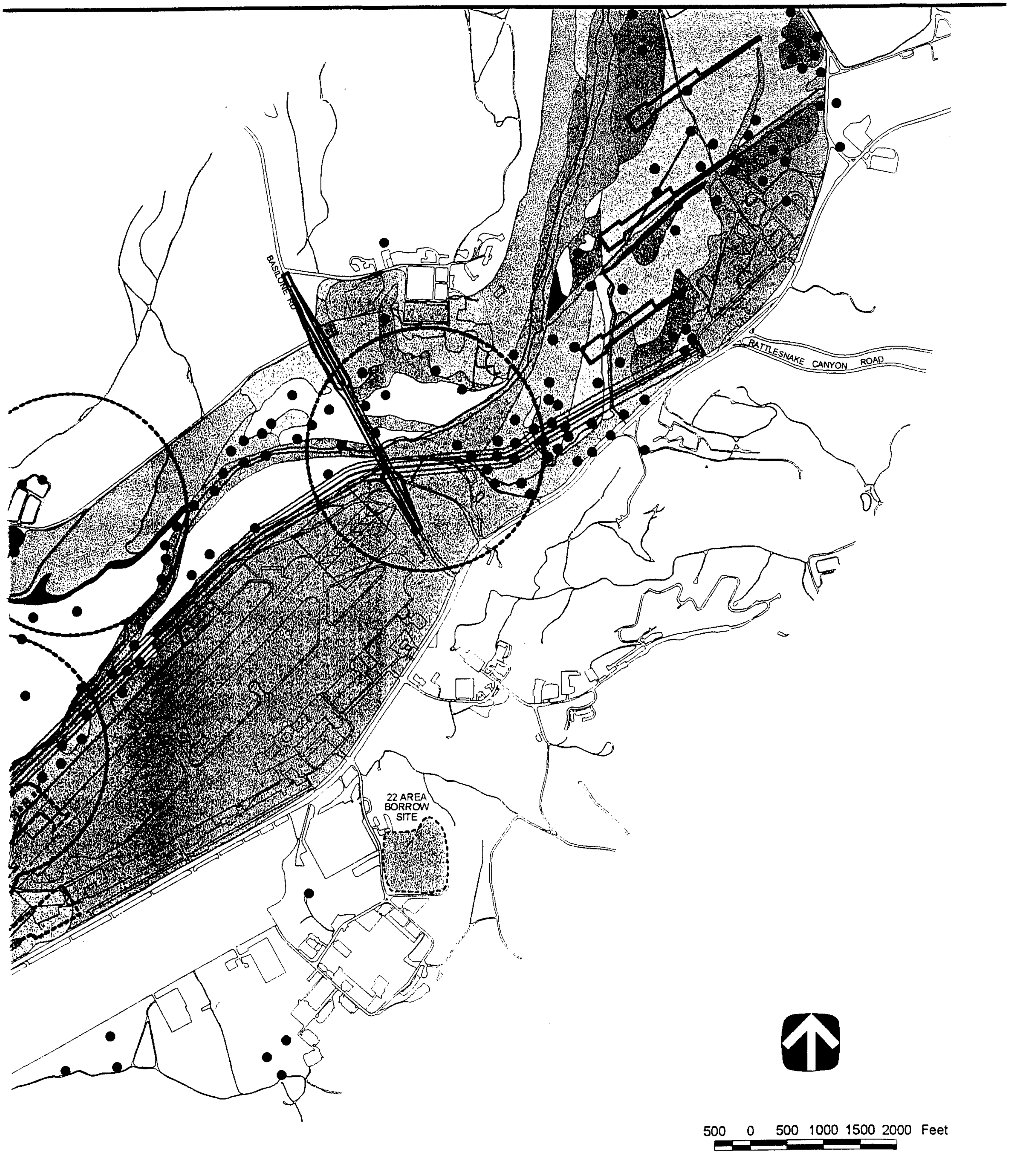
Temporary direct impacts to vegetation would result from the use for construction purposes of the construction corridor surrounding the levee. Upon completion of construction, the temporarily affected area would be restored to the original vegetation type where appropriate. Areas characterized by existing habitat dominated by invasive exotics would be restored to appropriate native plant communities. Revegetation following temporary impacts of low quality vegetation will result in a net benefit to the ecosystem. Of the total area temporarily affected by the proposed project, 18.5 acres are considered to represent significant impacts, as detailed below.

- Construction of Levee Alignment 1 would result in the temporary loss of 0.3 acre of freshwater marsh. The temporary loss of 0.3 acre of freshwater marsh represents a significant impact that can be mitigated to a level that is not significant.

- Construction of Levee Alignment 1 would result in the temporary loss of 12.5 acres of mixed willow exotic. The temporary loss of 12.5 acres of mixed willow exotic represents a significant impact that can be mitigated to a level that is not significant.


BASILONE RD
RIFLE
RANGE
ROAD
EAST OSCAR
BORROW SITE
VANDEGRIFT BLVD

1


BASILONE RD
RATTLESNAKE CANYON ROAD
22 AREA
BORROW
SITE
500 0 500 1000 1500 2000 Feet

Construction Alternatives
- Permanent Footprint
- Construction Corridor

Basemap Features
- Hydrology Features
- Roads, Parking, Airfield
- Borrow Site
- BRAC Projects

Habitat Categories
- Arundo
- Diegan Coastal Sage Scrub
- Disturbed
- Freshwater Marsh
- Grass Forb Mix
- Mixed Willow Exotic
- Riparian Scrub
- Riparian Woodland
- Tamarisk
- Water Gravel Mud

Species
- ▲ Southwestern Flycatcher
- ● Least Bell's Vireo
- Arroyo Southwestern Toad (500M Buffer)

Alternative 1A Habitat Impact and Sensitive Species

Figure 4.3 - 4

- Construction of Levee Alignment 1 would result in the temporary loss of 0.8 acres of riparian scrub. The temporary loss of 0.8 acres of riparian scrub represents a significant impact that can be mitigated to a level that is not significant.

- Construction of Levee Alignment 1 would result in the temporary loss of 0.9 acres of riparian woodland. The temporary loss of 0.9 acres of riparian woodland represents a significant impact that can be mitigated to a level that is not significant.

- Construction of Levee Alignment 1 would result in the temporary loss of 4.0 acres of open water/gravel, mud. The temporary loss of 4.0 acres of open water/gravel, mud represents a significant impact that can be mitigated to a level that is not significant.

In addition to these significant impacts, the construction of Levee Alignment 1 would result in the temporary use of areas currently supporting Arundo and grass-forb mix, as well as disturbed/developed lands, (as shown in Appendix D). The first two vegetation types are not considered sensitive and this temporary use does not represent a significant adverse impact. In fact, temporary disturbance to areas supporting invasive exotic species such as Arundo, and replacement with appropriate native vegetation represents a beneficial impact of the project. There would be no temporary impact to currently disturbed/developed areas (by definition).

Earthwork at the Chappo (22) Area borrow site would affect 17 acres of disturbed habitat, and at the East Oscar borrow site would affect 25.2 acres of disturbed habitat. The 3.1 acres of Diegan coastal sage scrub present at the East Oscar borrow site would not be disturbed (personal communication, Steve Cox, Winsler & Kelly, 1997). Wetlands would not be affected by earthwork at the borrow sites. The establishment of a temporary road from Rifle Road to the East Oscar borrow site would be required should the East Oscar borrow site be needed.

Indirect Impacts to Vegetation - Levee Alignment 1.

Levee Alignment 1 is not expected to result in significant indirect effects on upland communities. The predominant indirect effects of constructing this alternative would result from modifications of flows in the Santa Margarita River which may affect wetland and riparian vegetation types. Potential significant effects of this modification are addressed under indirect impacts to wetlands for Levee Alignment 3.

The predominant indirect effects of constructing Levee Alignment 1 would result from permanently isolating lands within the 100-year floodplain from flows in the Santa Margarita River. This would prevent normal river dynamics from operating on these lands. Lands identified as disturbed and developed are considered to be permanently removed from the floodplain and reserved for their

existing land use. The upland grass-forb mix habitat is presumed to be susceptible to eventual processing by the river and its removal is considered to be an adverse impact to the floodplain environment. Existing wetland and riparian vegetation types would be affected most and potential significant effects are addressed under indirect impacts to wetlands. The areal extent of vegetation isolated by the various alternatives is presented in Table 4.3.2-2. Construction of Levee Alignment 1 would result in substantially more habitat being isolated than the Preferred Alternative (Levee Alignment 3) or Levee Alignment 2.

Wildlife and Sensitive Species

Direct Impacts to General Wildlife - Levee Alignment 1.

Construction of Levee Alignment 1 would result in direct impacts to wildlife present within the habitats subject to disturbance. These direct impacts are expected to be similar to those described previously for Levee Alignment 3. However, substantially more acreage would be subject to permanent and temporary disturbance as a result of construction of Levee Alignment 1, and increased impacts to general wildlife species would occur relative to Levee Alignment 3.

Direct Impacts to Sensitive Wildlife - Levee Alignment 1.

Least Bell's Vireo. Construction of Levee Alignment 1 would result in the direct loss of occupied or occupiable breeding and foraging habitat of the federal and state endangered least Bell's vireo (vireo), as previously described for Alignment 3. However, substantially more acreage would be subject to permanent and temporary disturbance as a result of construction of Levee Alignment 1, and increased impacts to vireos would occur relative to Levee Alignment 3. Construction activities are expected to permanently impact 30.7 acres of vireo habitat, and temporarily impact an additional 37.0 acres. Both permanent and temporary impacts to vireo habitat are expected to occur during two breeding seasons (15 March through 31 August), with temporary impacts expected to occur over an additional three to ten breeding seasons as the impacted areas gradually regain the vegetation characteristics of occupiable vireo habitat. The net result of the temporarily impacted areas will be beneficial to the vireo because the current low quality habitat will be replaced with higher quality native vegetation. According to data gathered during 1995, the Santa Margarita floodplain supported about 461 least Bell's vireos (comprised of nesting pairs, territorial males, and undetermined status males). Based on data gathered during 1996, the Santa Margarita floodplain supported about 492 vireos, of which there are about 287 (pairs or males) present in the area of the proposed project. About 35 of these 287 made use of the area subject to direct permanent or temporary impacts as a result of Levee Alignment 1 construction, as shown on Figure 4.3-4.

The direct permanent disturbance to 30.7 acres of vireo habitat (consisting of 6.5 acres of Arundo, 8.2 acres of grass-forb mix, 13.1 acres of mixed willow exotic, 0.5 acre of riparian scrub, 0.8 acre

of riparian woodland, and 1.6 acres of tamarisk), and temporary disturbance to 24.3 acres of vireo habitat (consisting of 6.3 acres of Arundo, 10.9 acres of grass-forb mix, 12.5 acres of mixed willow exotic, 0.8 acres of riparian scrub, 0.9 acres of riparian woodland, and 2.8 acres of tamarisk), would directly disturb a minimum of 35 vireos, likely through displacement. No vireos are expected to be killed outright during construction activities, because vegetation clearing will be accomplished prior to the breeding season. In addition, some of the approximately 45 vireos which are present within about 250 feet of the limits of proposed construction may be directly disturbed by noise and dust generated during construction activities. These direct impacts (consisting of loss of breeding and foraging habitat, displacement of individuals, and disturbance due to noise and dust) to breeding vireos are considered significant.

The magnitude of these direct impacts to vireos can be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of increasing the quality of currently degraded vegetation to replace the lost vireo habitat, and avoidance of vegetation clearance during the breeding season.

Southwestern Willow Flycatcher. Construction of Levee Alignment 1 would result in the direct loss of occupied or occupiable habitat of the federal and state endangered southwestern willow flycatcher (flycatcher). According to data gathered during 1995, riparian vegetation along the Santa Margarita River supported ten pairs of flycatcher. Based on data gathered during 1996, there are five flycatcher territories along the Santa Margarita River in the area of the proposed project. No flycatcher territories are located in areas subject to direct permanent or temporary impacts as a result of Levee Alignment 1 construction, as also shown on Figure 4.3-4. However, one flycatcher territory which is present within about 250 feet of the limits of proposed construction may be directly disturbed by noise and dust generated during construction activities. These direct impacts to flycatchers are considered significant.

The magnitude of these direct impacts to flycatchers can be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of increasing the quality of currently degraded vegetation to replace the lost flycatcher habitat, and avoidance of vegetation clearance during the breeding season.

Arroyo Toad. Construction of Levee Alignment 1 may result in direct disturbance or mortality to arroyo toads (toads). Based on data gathered during 1996, arroyo toads occur along the Santa Margarita River from the eastern boundary of the base downstream to Stuart Mesa Road Bridge. Based on an evaluation of available toad location data, it appears that levee construction may not directly impact toad breeding pools. However, there is a potential for toad mortality by vehicle crushing in roadways and other construction areas. Without implementation of Best Management Practices, toads could be harmed from inadvertent fouling or pollution of the river

water from accidental fluid spill or other construction material discharge, and increased construction-related sedimentation. For example, concreting activities that result in concrete or affected water reaching toad breeding areas could affect an entire years reproductive output within a limited area downstream of the contamination site, due to changes in pH.

These direct impacts to toad populations (through crushing and loss of larvae due to pollution and sedimentation) are considered significant.

The magnitude of these direct impacts to arroyo toads would be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of avoidance of construction activities during the toad breeding season (as practicable), the use of biological construction monitors to remove toads from harm's way in construction areas, and the use of Best Management Practices to minimize the amount of construction-related sedimentation and the potential for fouling or pollution.

Federal Species of Concern. Construction of Levee Alignment 1 may result in direct disturbance to one or more federal wildlife species of concern. This direct disturbance is considered an adverse impact that is not significant due to the relative abundance and low sensitivity status of most federal species of concern.

Indirect Impacts to General Wildlife - Levee Alignment 1.

Construction of Levee Alignment 1 may result in indirect disturbance to general wildlife and habitat as a result of the altered hydrological regime in the area which will be isolated behind the levee and removed from the floodplain. These isolated riparian habitats (including 32.9 acres of Arundo, 0.8 acres of freshwater marsh, 67.0 acres of mixed willow exotic, 0.1 acre of riparian woodland, and 4.8 acres of open water/open wash) will eventually change in character due to the lack of scour and deposition of sediment. The suite of wildlife species currently inhabiting these isolated habitats will either acclimate to the gradual succession of early seral riparian scrub habitats to mature woodland habitats (in the case of habitat generalists), or will gradually emigrate from the area as habitat conditions change such that they can no longer be supported (in the case of habitat specialists). These wildlife habitat specialists would then be expected to be replaced by a suite of wildlife habitat specialists appropriate to more mature vegetation types. This indirect impact to general wildlife species is not considered significant.

Indirect Impacts to Sensitive Wildlife - Levee Alignment 1.

Least Bell's Vireo and Southwestern Willow Flycatcher. Construction of Levee Alignment 1 may affect the distribution of least Bell's vireo and southwestern willow flycatcher as a result of isolation

of the area behind the levee and its removal from the floodplain. These isolated habitats currently are occupied by about 40 least Bell's vireo, and may eventually change in character due to the lack of scour and deposition of sediment which is critical to sustaining and regenerating high quality vireo habitat. This potential eventual degradation and elimination of vireo habitat represents a significant indirect impact. The magnitude of this direct impact to vireo can be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of mechanical manipulation (as needed) of the vegetation isolated by the levee such that the functional value for high quality vireo habitat is maintained through time. While flycatchers may be affected, along the Santa Margarita River they appear to occur in more mature riparian habitats than do vireo (personal communication, Environmental Security, MCB Camp Pendleton, 1997). Whereas vireo tend to occur in more shrubby riparian vegetation, flycatchers make use of shrubby vegetation as well as large, mature willow trees. As such, flycatchers may do well within the isolated area, should the riparian vegetation mature into more woodland forms.

Arroyo Toad. Construction of Levee Alignment 1 may result in indirect disturbance to arroyo toads as a result of changes in the river. Any changes which would occur in the project area and which would negatively affect toads would likely be offset by changes which could positively affect toad habitat. The development of a mature riparian woodland in the area isolated behind the levee may continue to provide good (or better) toad habitat (personal communication, Environmental Security, MCB Camp Pendleton, 1997).

Wetlands. This analysis is based upon the recently completed delineation of waters of the United States and adjacent wetlands (Figures 4.3-4.1 through 4.3-4.3). All of the wetland acreage discussed below is also included in the vegetation/habitat acreages previously considered. The construction of Levee Alignment 1 would occur predominantly within the floodplain of the Santa Margarita River. Much of the affected vegetation and habitat is characterized as riparian and is dependent on water and the interaction of flowing water with the floodplain environment. The jurisdictional delineation for the project area evaluated the impacts to wetlands of 'Alternative 1' which includes Levee Alignment 1 and either of the Bridge Alignments A, B, or C.

Direct Impacts to Wetlands - "Alternative 1"

Implementation of "Alternative 1" would have direct adverse effects on a total of 24.3 acres of wetlands, as shown in Table 4.3.2-3. The delineation identified 12.8 acres of direct permanent impact to wetlands, plus an additional direct temporary impact to 11.5 acres of wetlands. The permanent and temporary loss of jurisdictional wetlands is a significant impact. The magnitude of this impact can be reduced to a level that is not significant.

Indirect Impacts to Wetlands - "Alternative 1"

Construction of "Alternative 1" will result in the full isolation (and loss) of 26.0 acres of wetlands. This loss is expected to be permanent. In addition, 6.9 acres will be partially isolated, as shown in Table 4.3.2-3. This partial isolation may represent a permanent impact, or the effect may occur on a temporary basis. Additional discussion of project related indirect impacts to wetlands and waters of the United States are discussed under Levee Alignment 3.

In summary, construction of 'Alternative 1' would result in direct permanent and temporary, as well as indirect permanent and temporary impacts to a total of 57.2 acres of wetlands. This impact is significant, but the magnitude can be reduced.

River Training Structures

The river training structures associated with Levee Alignment 1 include three spur dikes and silt fences located upstream of the Basilone Road Bridge on the floodplain southeast of the channel (Figure 4.3-4).

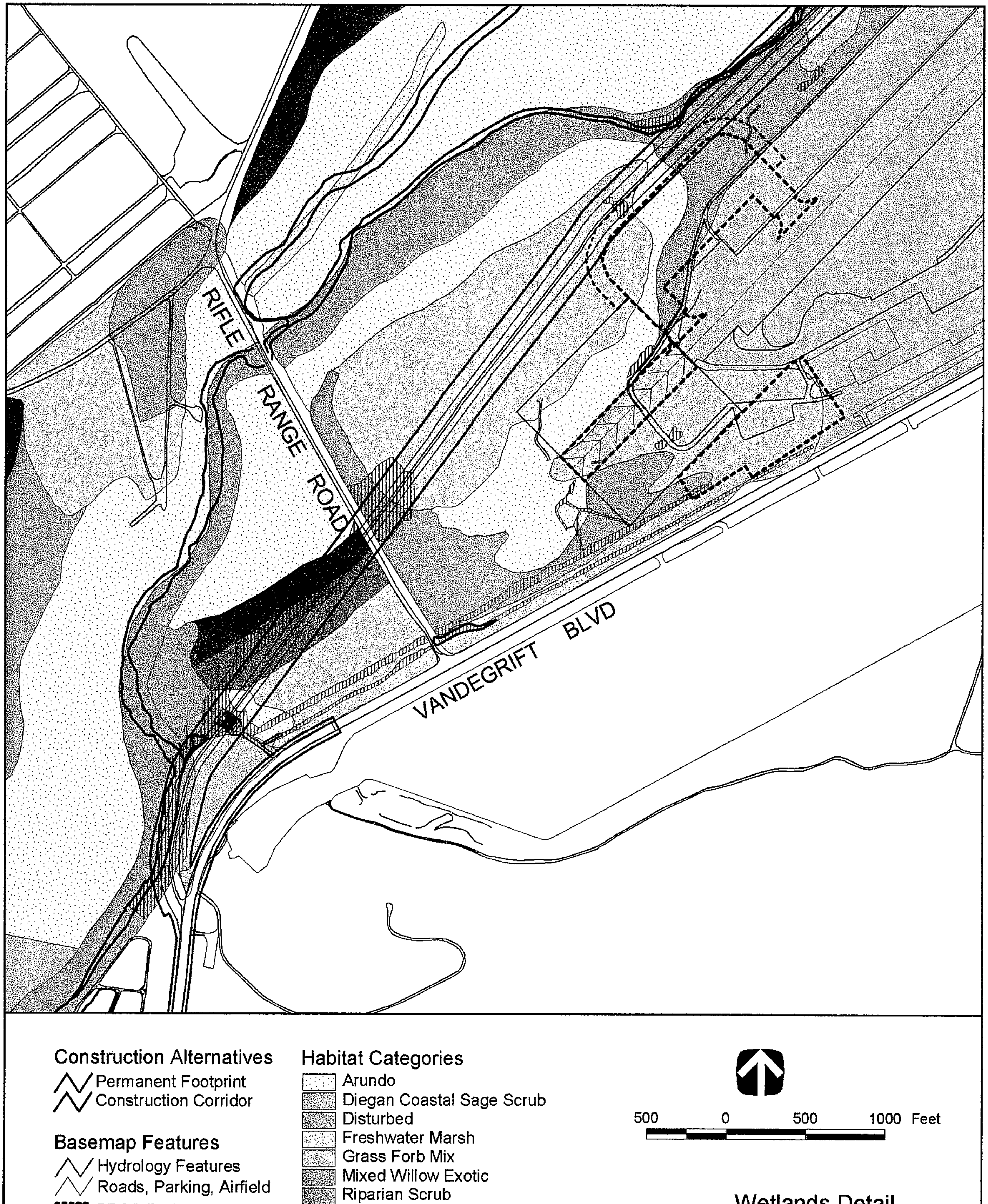
Vegetation

Direct Impacts to Vegetation - River Training Structures

Construction of the spur dikes and silt fences would result in permanent loss of 9.4 acres of vegetation with 2.5 acres of loss considered significant. Temporary loss of habitat would total 7.4 acres of which 1.7 acres is considered to be significant.

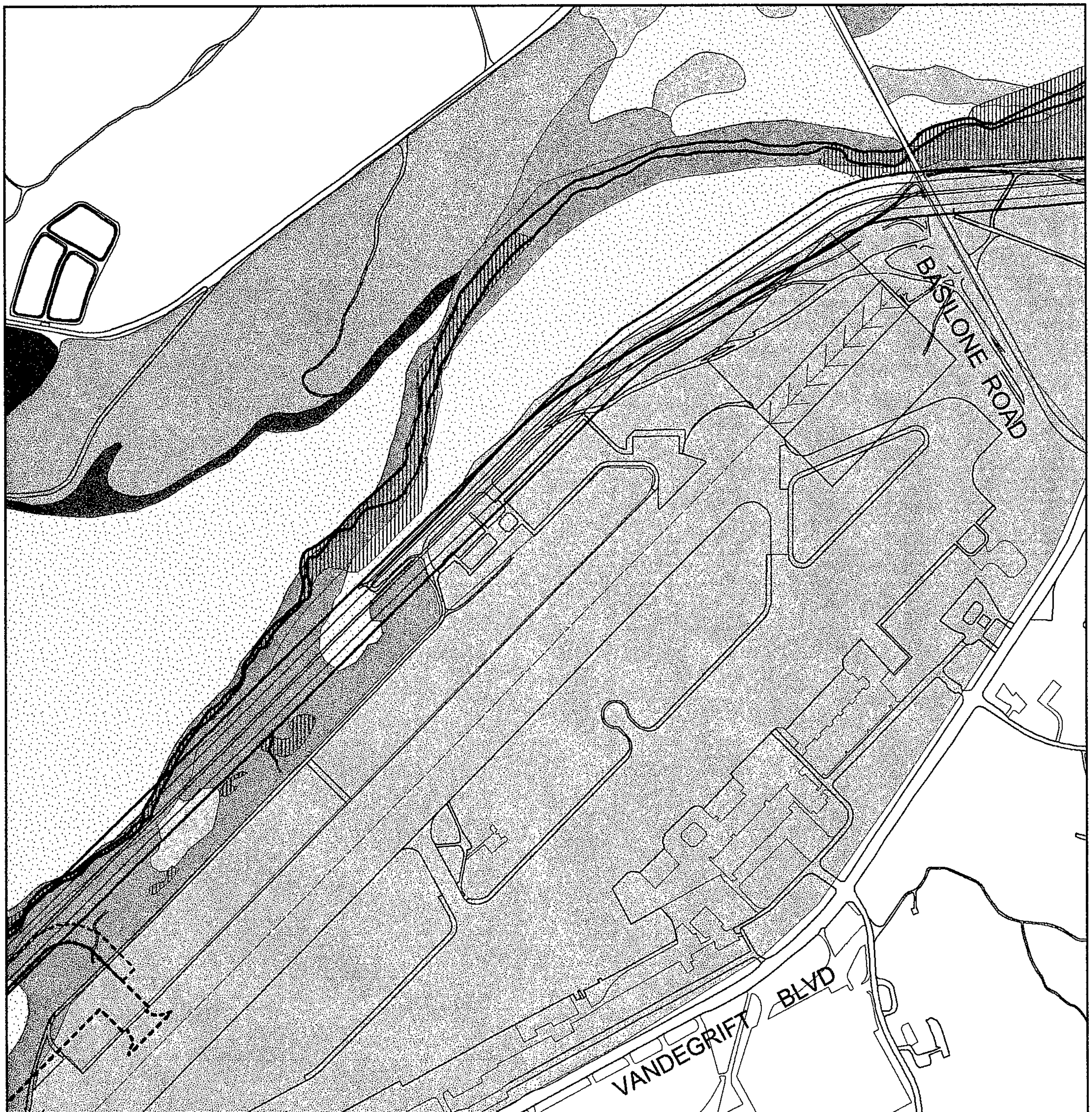
Permanent Impacts. Permanent habitat loss would occur within the spur dike footprint. Little permanent loss would be associated with the silt fences since the area required for the placement of poles and clearing of brush to stretch the geotextile would be small.

- Construction of the spur dikes and silt fences would result in the permanent loss of 0.8 acres of mixed willow exotic habitat. The permanent loss of 0.8 acre of mixed willow exotic represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.



Wetlands Detail
Levee Alignment 1
Southwest Section

Figure 4.3 - 4.1



Construction Alternatives
Permanent Footprint
Construction Corridor

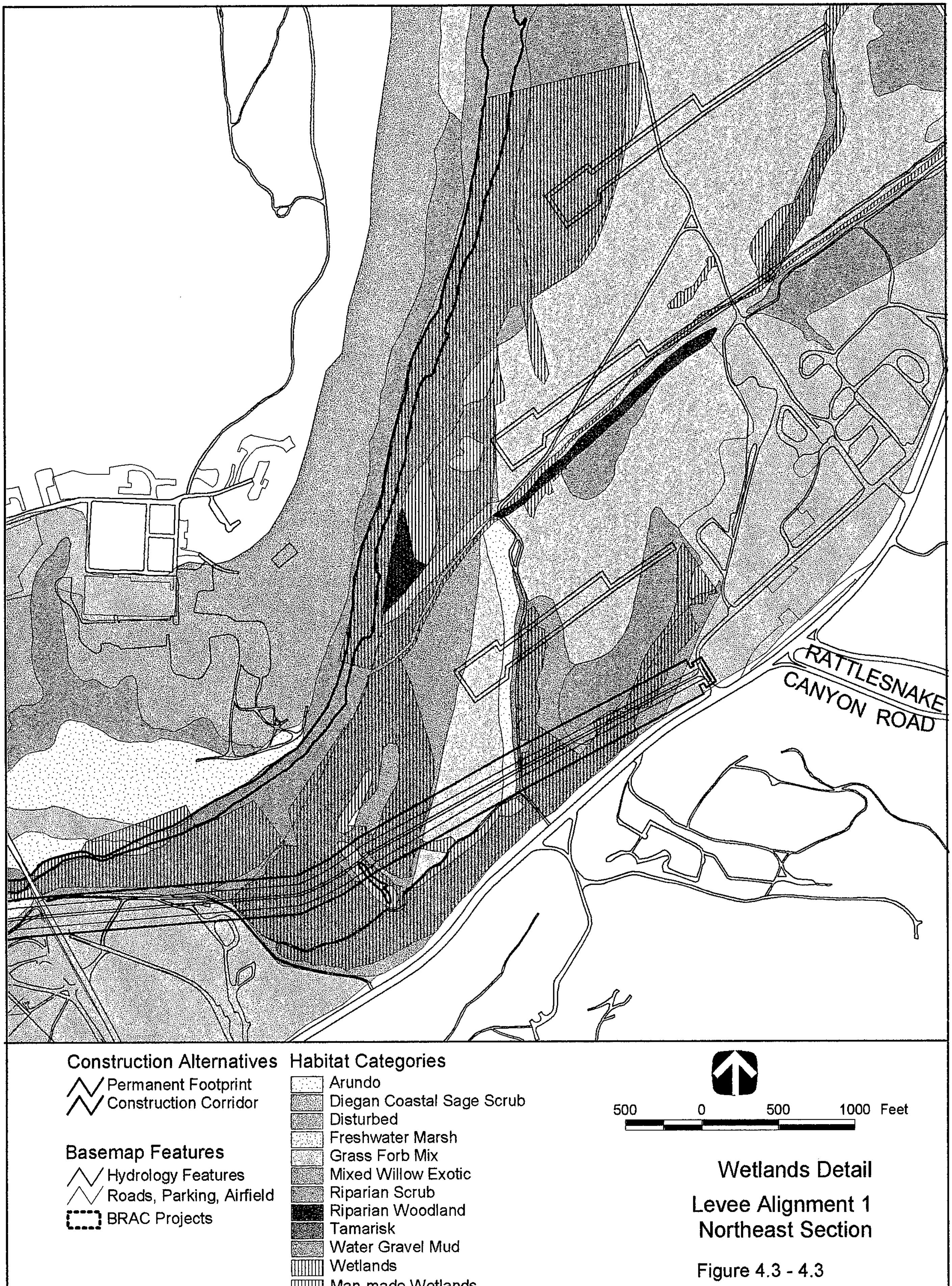
Basemap Features
Hydrology Features
Roads, Parking, Airfield
BRAC Projects

Habitat Categories
Arundo
Diegan Coastal Sage Scrub
Disturbed
Freshwater Marsh
Grass Forb Mix
Mixed Willow Exotic
Riparian Scrub
Riparian Woodland
Tamarisk
Water Gravel Mud
Wetlands
Man-made Wetlands

500 0 500 1000 Feet

Wetlands Detail
Levee Alignment 1
Mid Section

Figure 4.3 - 4.2



Wetlands Detail

Levee Alignment 1
Northeast Section

Figure 4.3 - 4.3

- Construction of the spur dikes and silt fences would result in the permanent loss of 1.7 acre of riparian scrub habitat. The permanent loss of 1.7 acres of riparian scrub represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.

In addition to these significant impacts, the construction of the spur dikes and silt fences would result in the permanent loss of Arundo, grass-forb mix, and disturbed/developed lands (Appendix D). These vegetation types are not considered sensitive and their loss does not represent a significant impact.

Temporary Impacts. Construction of the spur dikes and silt fences would result in a temporary loss of habitat totaling 7.4 acres of which 1.7 acres would be considered significant impacts to vegetation. Upon completion of construction, the temporarily affected area would be restored to the original vegetation type where appropriate, in a manner consistent with that described in the USFWS programatic riparian and estuarine Biological Opinion and MCB Camp Pendleton conservation plan. Areas characterized by existing habitat dominated by invasive exotics would be restored to appropriate native vegetation types. Revegetation following temporary impacts of low quality vegetation will result in a net benefit to the ecosystem. Of the total area temporarily affected by the proposed project, 1.1 acres are considered to represent significant impacts, as detailed below.

- Construction of the spur dikes and silt fences would result in the temporary loss of 0.6 acre of mixed willow exotic. The temporary loss of 0.6 acre of mixed willow exotic represents a significant impact. The magnitude of this impact can be reduced to a level that is not significant.

- Construction of the spur dikes and silt fences would result in the temporary loss of 1.1 acres of riparian scrub. The temporary loss of 2.5 acres of riparian scrub represents a significant impact. The magnitude of this impact can be reduced to a level that is not significant.

In addition to these significant impacts, the construction of the spur dikes and silt fences would result in the temporary use of areas currently supporting Arundo and grass-forb mix, as well as disturbed/developed lands (as shown in Appendix D). The first two vegetation types are not considered sensitive and this temporary use does not represent a significant adverse impact. In fact, temporary disturbance to areas supporting invasive exotic species such as Arundo, and replacement with appropriate native vegetation represents a beneficial impact of the project. There would be no temporary impact to currently disturbed/developed areas (by definition).

Indirect Impacts. Since woody riparian species have evolved in the dynamic floodplain environment most are adapted to changes in sediment depth that do not scour the root systems sufficiently to make the tree or shrub susceptible to being uprooted or thrown. During increasing sediment depth the woody species are expected to survive and are likely to extend adventitious roots into the available substrate. During a scouring event, removal of this sediment may result in a loss of root mass but most trees would be expected to survive. Shrubs such as mule fat and sandbar willow may be more affected by scouring events. The long term effect on the trees will probably be alternating periods of enhanced growth during the sedimentation phase and a few years of reduced growth as they adapt to scouring events. Understory herbs may show stronger responses to fluctuations in sediment depth. Those capable of extending rhizomes up to the surface should continue to occur on the affected areas during the accumulation phase unless large amounts of sediment are deposited during a single year or the sediment becomes deep enough to reduce their access to adequate moisture. Changes in density and cover of herb species is expected to vary during the accumulation and degradation phases. Rapid accumulations of deep sediments may favor species adapted to more xeric conditions.

Seed reproduction of trees, shrubs and riparian herbs may be affected. The relatively narrow range of conditions required for willow and cottonwood seed germination and establishment is likely to limit the number of years and locations suitable for recruitment of new individuals into the community. The most favorable locations are likely to be near the low flow channel of along side channels that maintain high surface moisture during the germination and establishment period.

Stormwater Management System. Impacts to biological resources resulting from the construction of the Stormwater Management System associated with Alternative 1A are the same as those for Alternative 3A.

Bridge Alignment A-Existing Basilone Road Bridge Alignment. Impacts to biological resources resulting from the construction of Bridge Alignment A are the same as those described for Alternative 3A.

4.3.2.5 Alternative 1B [Levee Alignment 1 + Bridge Alignment B]

Impacts of Alternative 1B on biological resources are presented in Table 4.3.4-5 and Appendix D.

Levee Alignment 1. Impacts to biological resources resulting from the construction of Levee Alignment 1 are the same as those described for Alternative 1A (Figure 4.3-5).

Stormwater Management System. Impacts to biological resources resulting from the construction of the Stormwater Management System associated with Alternative 1B are the same as those described for Alternative 3A.

Bridge Alignment B-East Curve Alignment. Impacts to biological resources resulting from the construction of Bridge Alignment B are the same as those described for Alternative 3B.

4.3.2.6 Alternative 1C [Levee Alignment 1 + Bridge Alignment C]

Impacts of Alternative 1C on biological resources are presented in Table 4.3.4-6 and Appendix D.

Levee Alignment 1. Impacts to biological resources resulting from the construction of Levee Alignment 1 are the same as those described for Alternative 3A (Figure 4.3-6).

Stormwater Management System. Impacts to biological resources resulting from the construction of the Stormwater Management System associated with Alternative 1C are the same as those described for Alternative 3A.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Impacts to biological resources resulting from the construction of Bridge Alignment C are the same as those described for Alternative 3C.

4.3.2.7 Alternative 2A [Levee Alignment 2 + Bridge Alignment A]

The relationship between the infrastructure components of Alternative 2A and existing biological resources is shown in Figure 4.3-7. Construction of Levee Alignment 2 would permanently disturb 15.4 acres (including eliminating 9.9 acres of habitat and 'disturbing' 5.5 acres of currently disturbed/developed areas) and the associated construction corridor would temporarily disturb 36.1 acres (25.6 acres of habitat, 10.5 acres of disturbed/developed), while construction of the six spur dikes would permanently disturb 18.7 acres of habitat, and temporarily disturb 11.4 acres of habitat.

The stormwater management system includes a pump house on 0.7 acre of land in the levee footprint. Bridge Alignment A crosses the Santa Margarita River at the existing Basilone Road crossing. The bridge would be 1,125 feet in length. The bridge approaches and bents would permanently disturb 4.2 acres (1.7 acres of habitat, 2.5 acres of disturbed/developed) and temporarily disturb 4.7 acres (2.9 acres of habitat, 1.8 acres of disturbed/developed).

The combined direct impacts to vegetation and habitat affected by Alternative 2A are summarized in Table 4.3.4-7. Construction would permanently cover 8.0 acres of disturbed/developed areas, and an additional 12.5 acres of disturbed/developed lands would be temporarily used during construction. These direct 'impacts' to previously disturbed areas total 20.5 acres and are not considered significant. Impacts to all other vegetation and habitat types are considered significant. Permanent significant direct impacts total 55.1 acres. Temporary significant direct impacts total 39.9 acres. Therefore, the total significant direct impacts resulting from the construction of Alternative 2A would be 95.0 acres. Each of the components of Alternative 2A are discussed below.

Levee Alignment 2

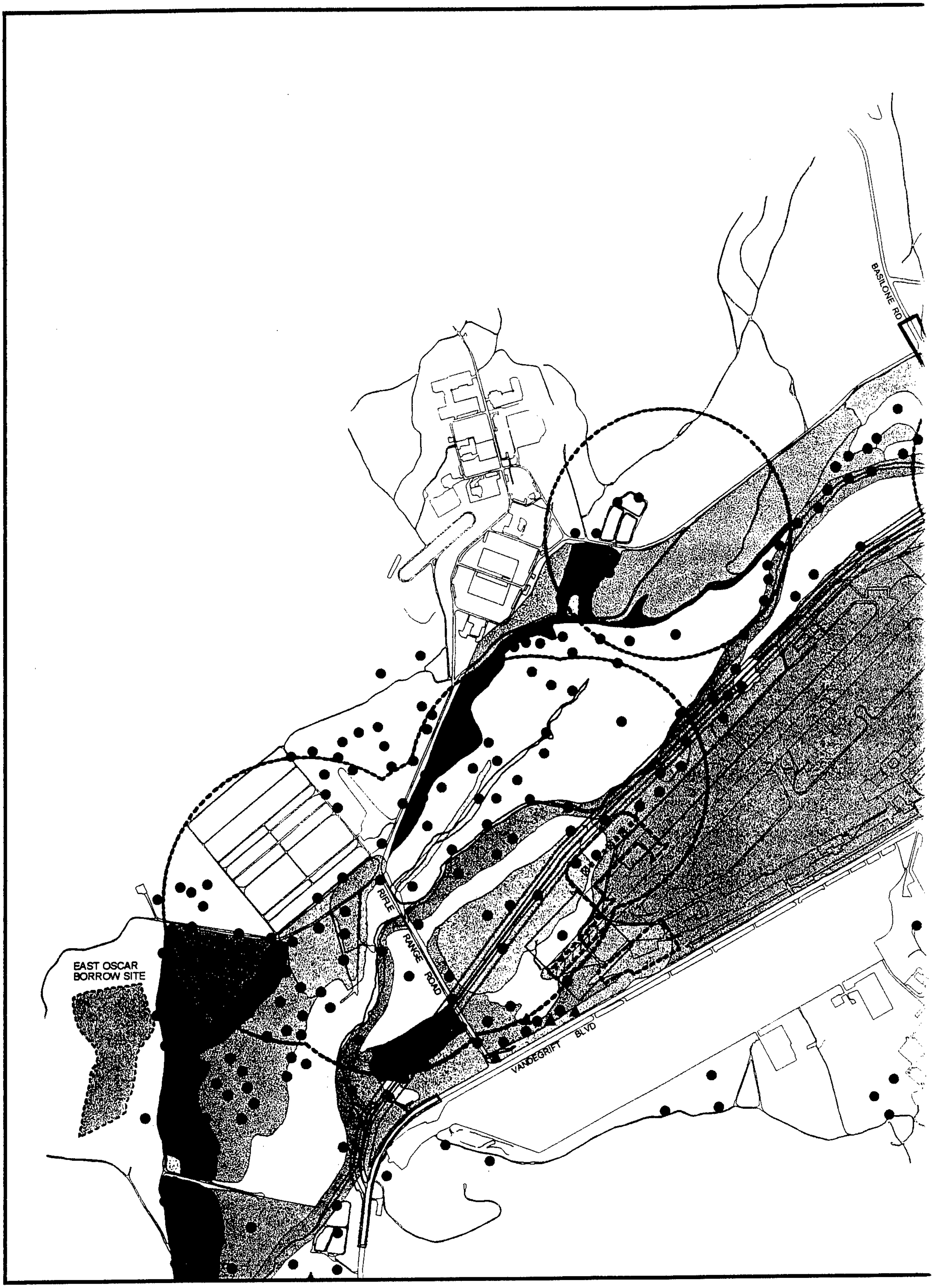
Vegetation. The construction of Levee Alignment 2 would result in significant impacts to vegetation. The impact acreage is provided in Appendix D. In certain cases, impacts to vegetation may not be considered significant based upon its intrinsic biological value (for example, vegetation dominated by exotic species), but the impacts may be considered important relative to endangered species conservation due to the potential to restore higher quality habitat.

Direct Impacts to Vegetation -Levee Alignment 2.

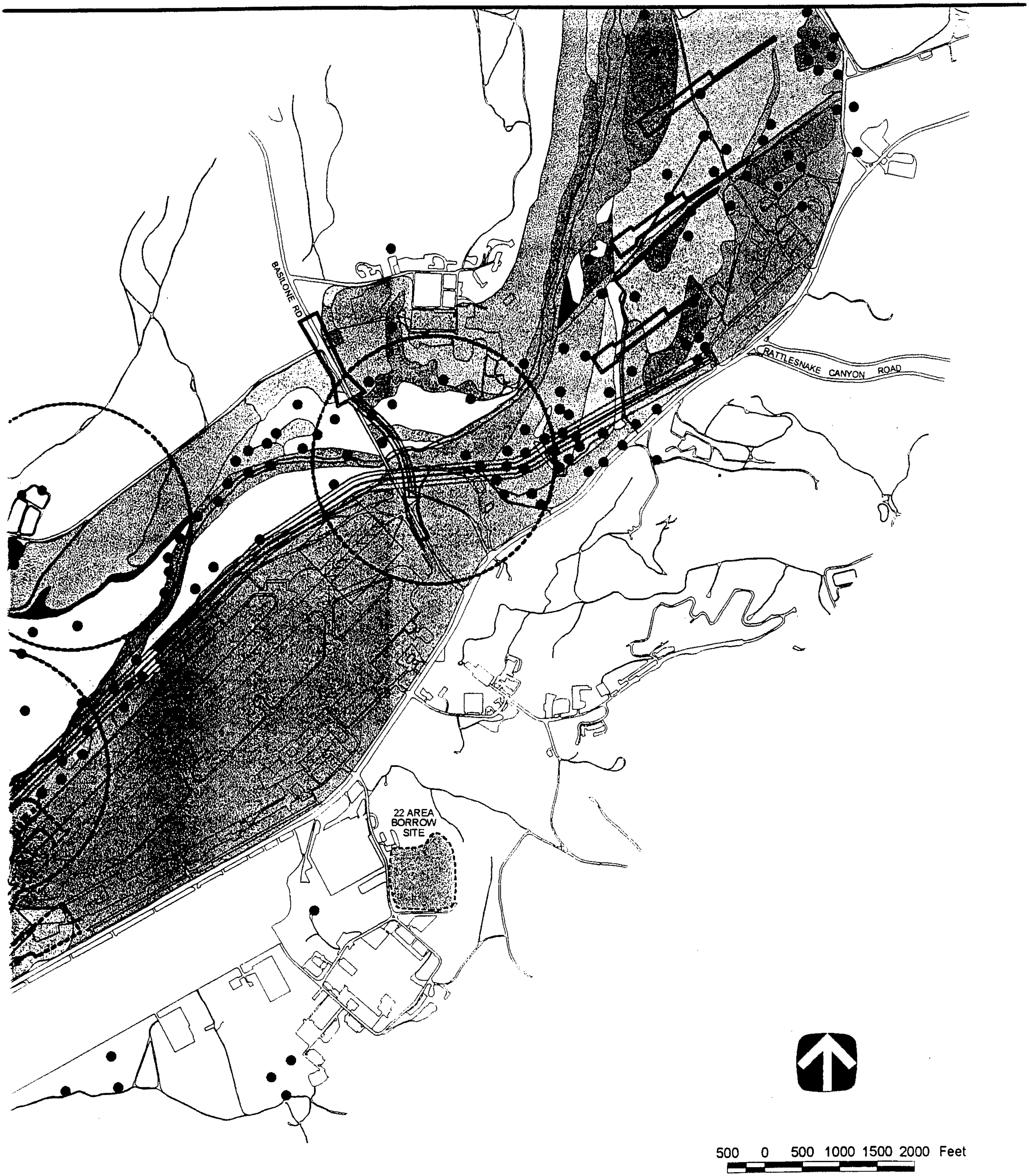
Implementation of Levee Alignment 2 would directly affect a total of 51.5 acres. This includes 15.4 acres of permanent impact (including eliminating 9.9 acres of habitat and 'disturbing' 5.5 acres of currently disturbed/developed areas) and the associated construction corridor would temporarily disturb 36.1 acres (25.6 acres of habitat, 10.5 acres of disturbed/developed).

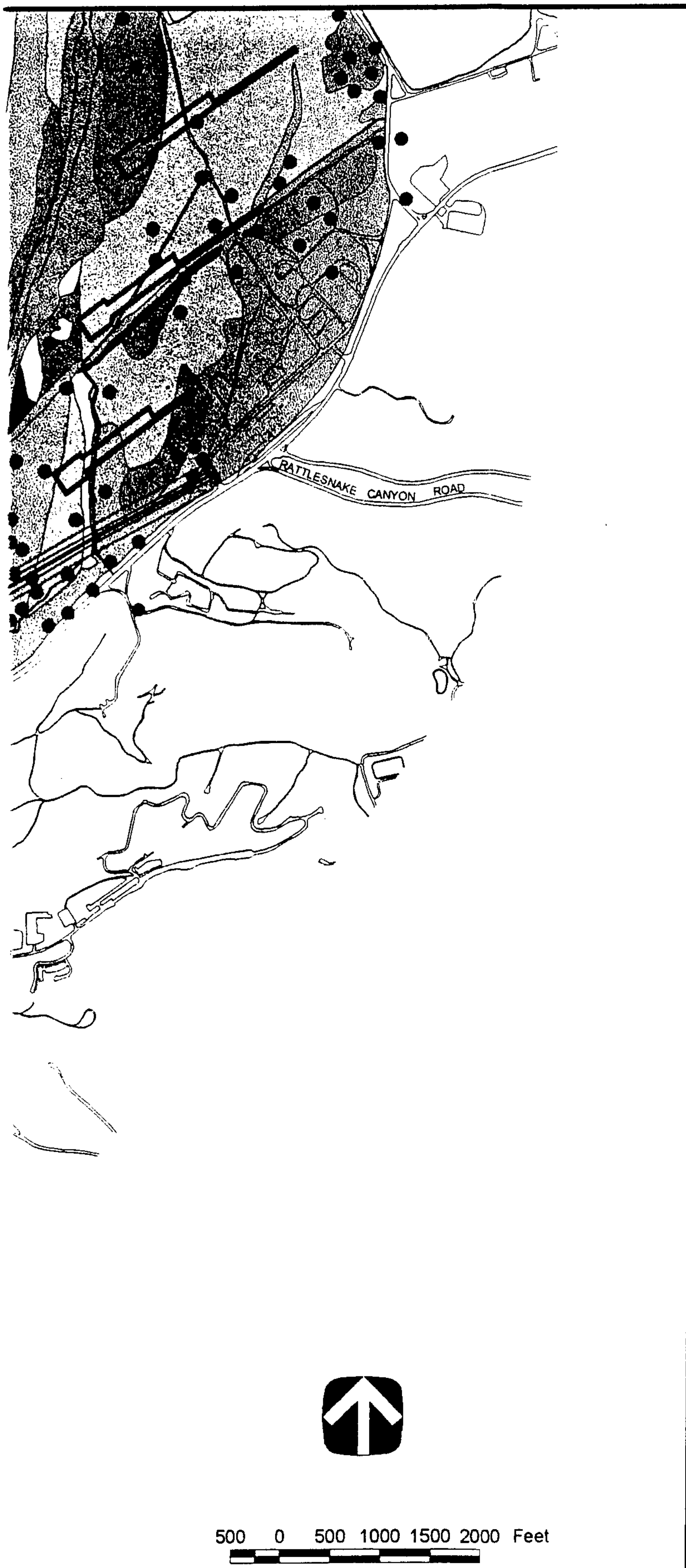
The permanent direct impacts to vegetation associated with the construction of the levee would occur primarily from vegetation removal, grading and placement of the earth and concrete levee materials. Permanent habitat loss would occur within the levee footprint. Of the total area permanently affected, 4.6 acres are considered to represent significant impacts, as detailed below.

- Construction of Levee Alignment 2 would result in the permanent loss of 3.0 acres of mixed willow exotic. The permanent loss of 3.0 acres of mixed willow represents a significant impact that can be mitigated to a level that is not significant.


BASILONE RD
EAST OSCAR
BORROW SITE
RIFLE
RANGE
ROAD
VANDEGRIFT BLVD

(1)


BASILONE RD
RATTLESNAKE CANYON ROAD
22 AREA
BORROW
SITE
500 0 500 1000 1500 2000 Feet



Construction Alternatives
- Permanent Footprint
- Construction Corridor

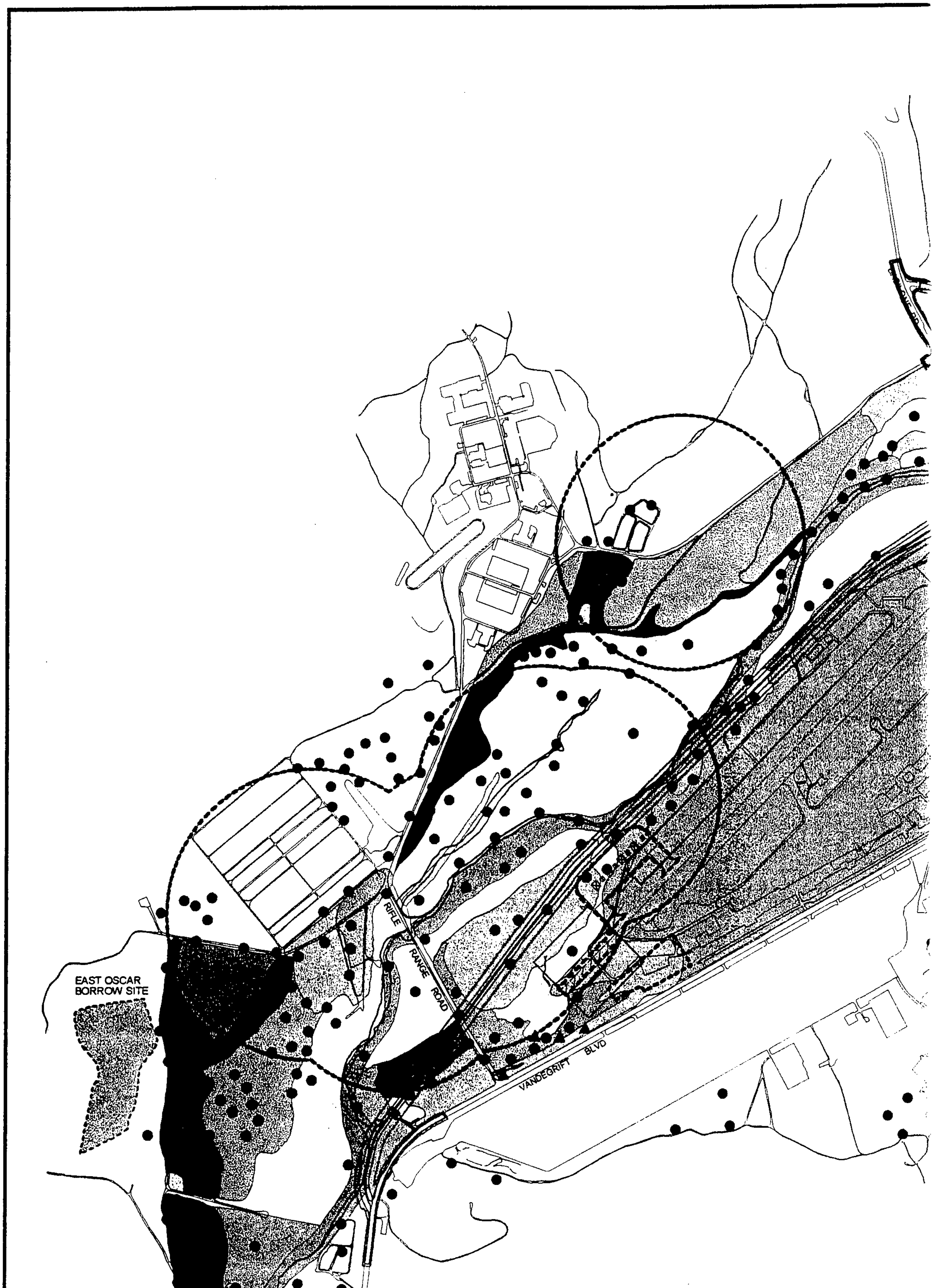
Basemap Features
- Hydrology Features
- Roads, Parking, Airfield
- Borrow Site
- BRAC Projects

Habitat Categories
- Arundo
- Diegan Coastal Sage Scrub
- Disturbed
- Freshwater Marsh
- Grass Forb Mix
- Mixed Willow Exotic
- Riparian Scrub
- Riparian Woodland
- Tamarisk
- Water Gravel Mud

Species
- ▲ Southwestern Flycatcher
- ● Least Bell's Vireo
- Arroyo Southwestern Toad (500M Buffer)

Alternative 1B
Habitat Impact and
Sensitive Species

Figure 4.3 - 5



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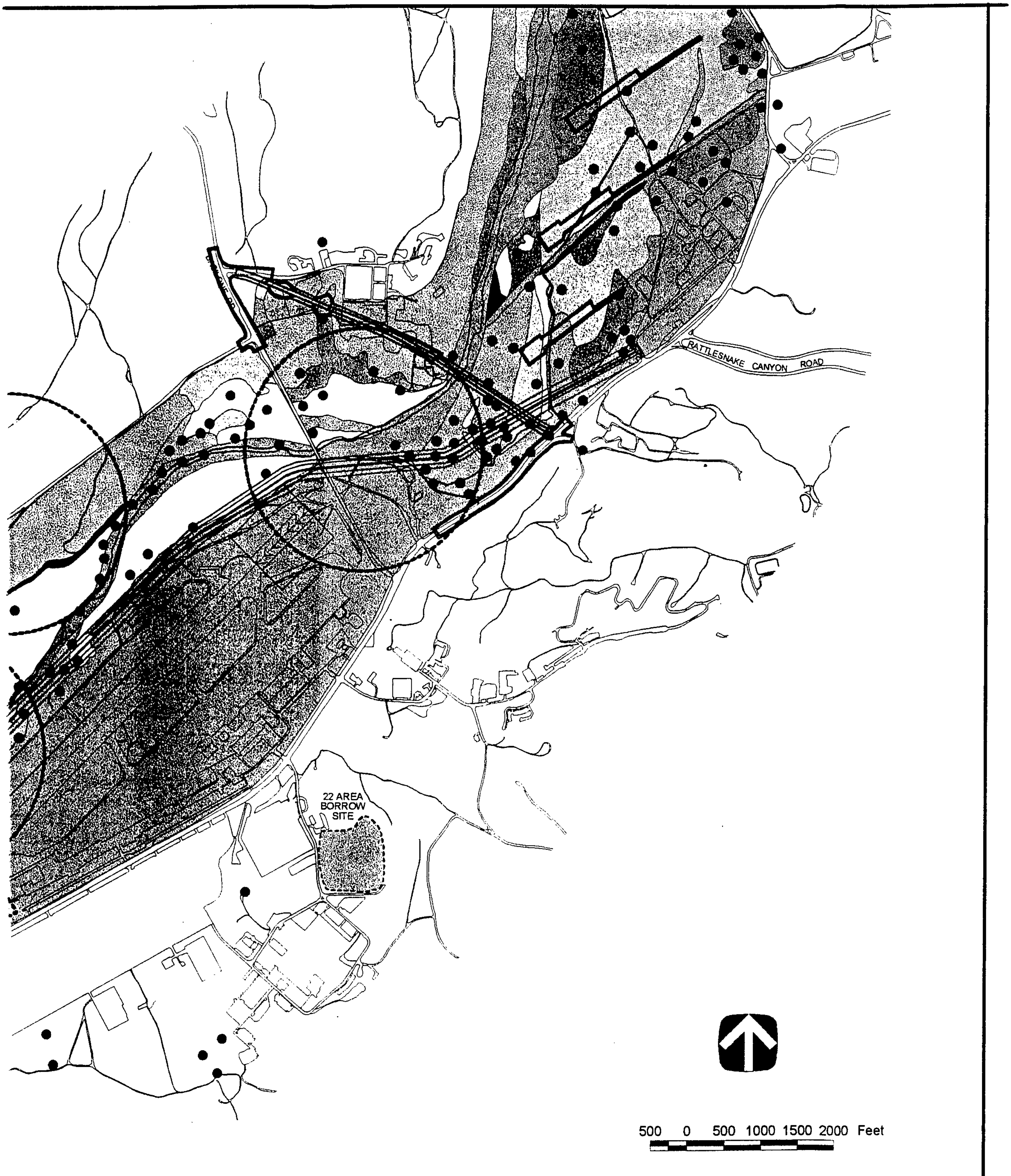
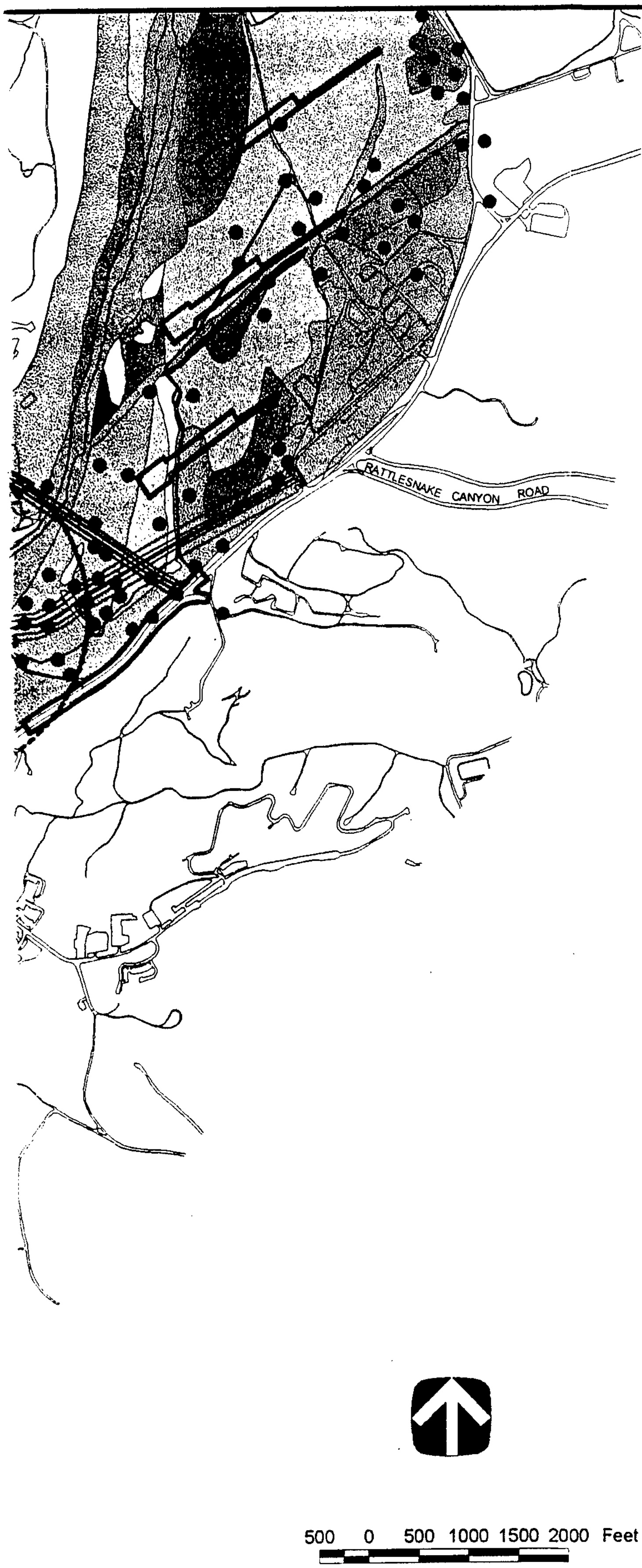


RATTLESNAKE CANYON ROAD
22 AREA
BORROW
SITE
500 0 500 1000 1500 2000 Feet



Construction Alternatives

- Permanent Footprint
- Construction Corridor

Basemap Features

- Hydrology Features
- Roads, Parking, Airfield
- Borrow Site
- BRAC Projects

Habitat Categories

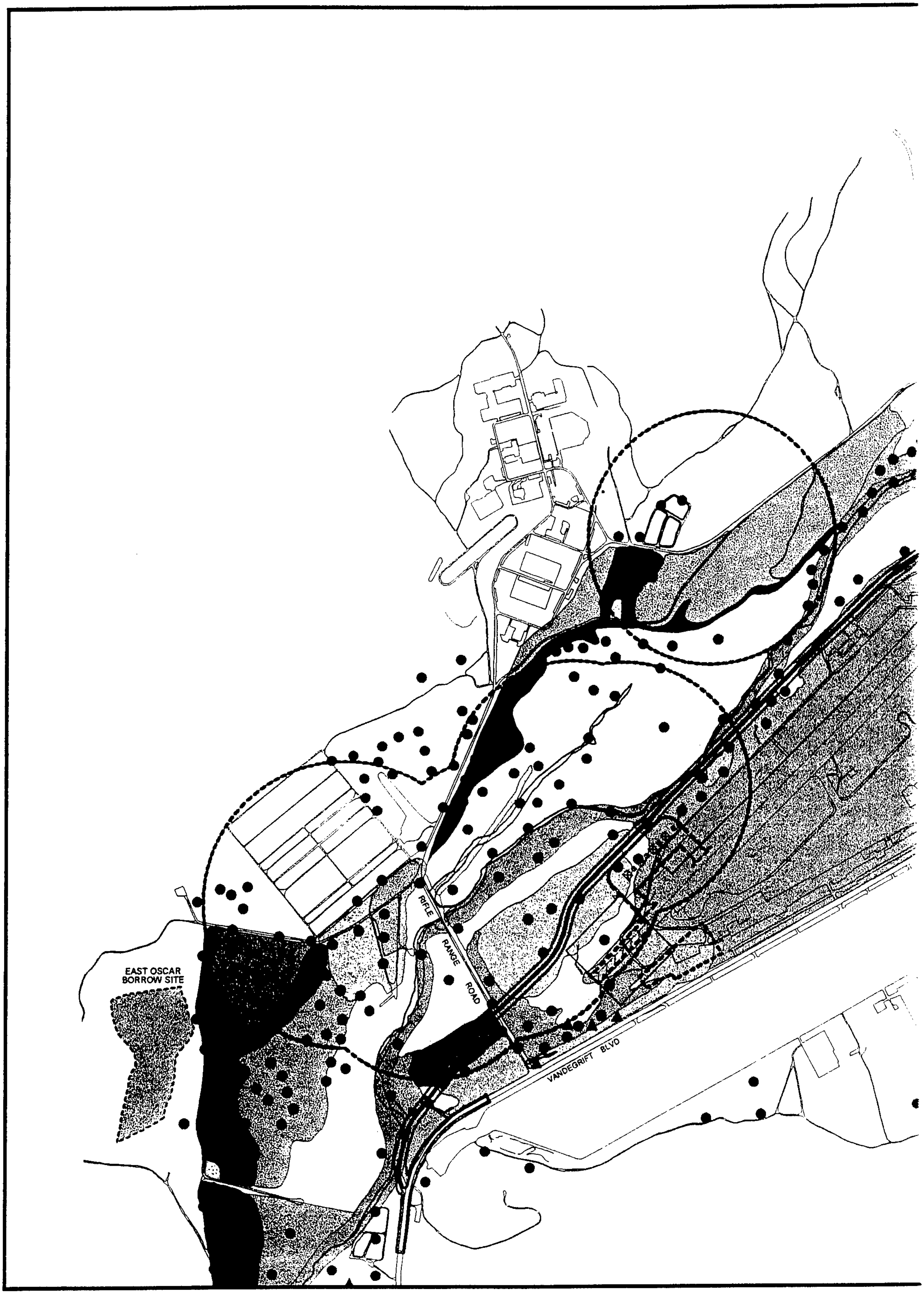
- Arundo
- Diegan Coastal Sage Scrub
- Disturbed
- Freshwater Marsh
- Grass Forb Mix
- Mixed Willow Exotic
- Riparian Scrub
- Riparian Woodland
- Tamarisk
- Water Gravel Mud

Species

- Southwestern Flycatcher
- Least Bell's Vireo
- Arroyo Southwestern Toad (500M Buffer)

Alternative 1C
Habitat Impact and
Sensitive Species

Figure 4.3 - 6



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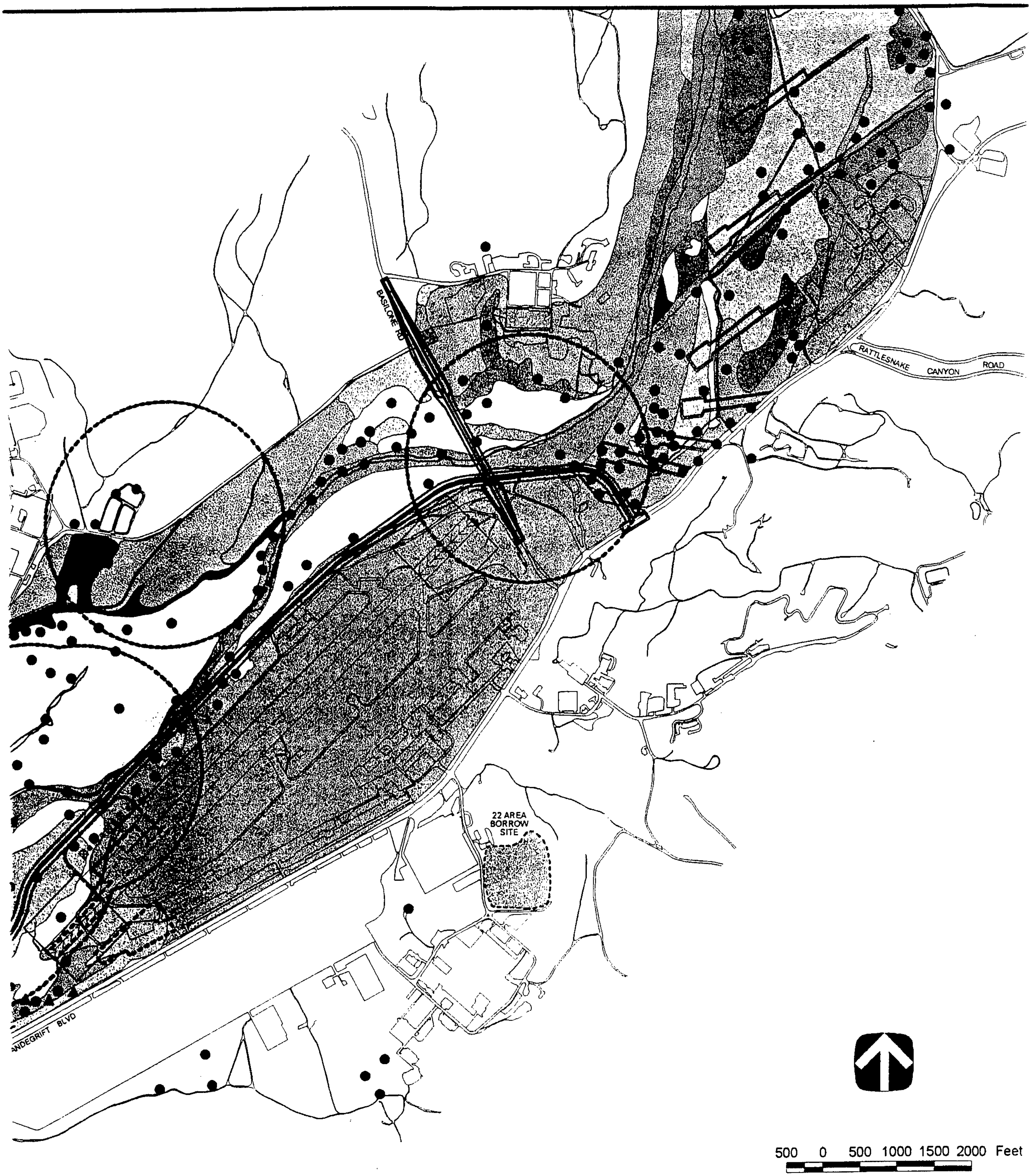
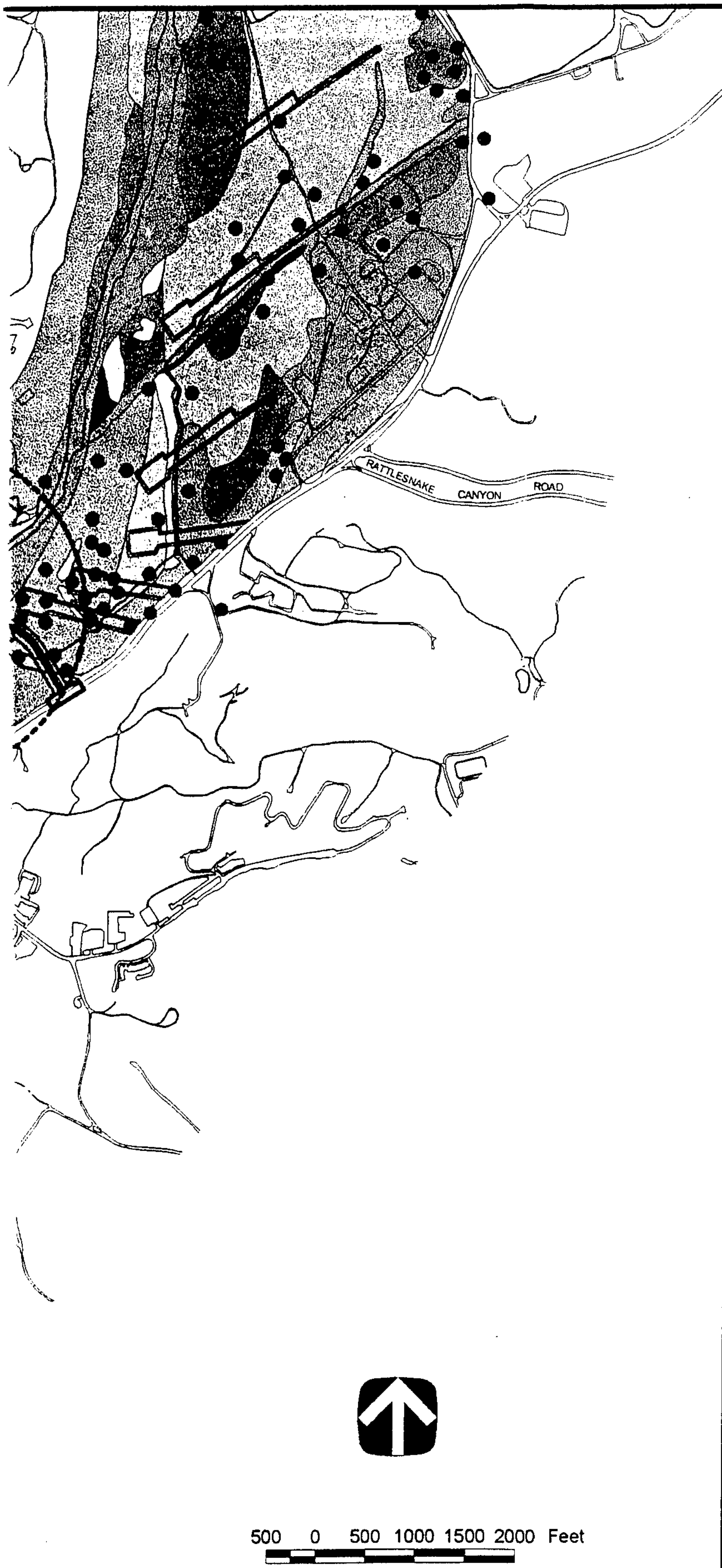

BASILONE RD
RATTLESNAKE CANYON ROAD
22 AREA
BORROW
SITE
ANDEGRIFT BLVD
500 0 500 1000 1500 2000 Feet



Construction Alternatives
- Permanent Footprint
- Construction Corridor

Basemap Features
- Hydrology Features
- Roads, Parking, Airfield
- Borrow Site
- BRAC Projects

Habitat Categories
- Arundo
- Diegan Coastal Sage Scrub
- Disturbed
- Freshwater Marsh
- Grass Forb Mix
- Mixed Willow Exotic
- Riparian Scrub
- Riparian Woodland
- Tamarisk
- Water Gravel Mud

Species
- Southwestern Flycatcher
- Least Bell's Vireo
- Arroyo Southwestern Toad (500M Buffer)

Alternative 2A Habitat Impact and Sensitive Species

Figure 4.3 - 7

- Construction of Levee Alignment 2 would result in the permanent loss of 0.2 acre of riparian woodland. The permanent loss of 0.2 acre of riparian woodland represents a significant impact that can be mitigated to a level that is not significant.

- Construction of Levee Alignment 2 would result in the permanent loss of 1.4 acres of open water/gravel, mud. The permanent loss of 1.4 acres of open water/gravel, mud represents a significant impact that can be mitigated to a level that is not significant.

In addition to these significant impacts, the construction of Levee Alignment 2 would result in the permanent loss of Arundo, tamarisk, disturbed/developed lands and grass-forb mix vegetation (Appendix D). These vegetation types are not considered sensitive and their loss does not represent a significant impact.

Temporary direct impacts to vegetation would result from the construction of the removal of vegetation and use for construction purposes of the construction corridor surrounding the levee. Upon completion of construction, the temporarily affected area would be restored to the original vegetation/habitat type where appropriate. Areas characterized by existing habitat dominated by invasive exotics would be restored to appropriate native vegetation/habitat types. Of the total area temporarily affected by the proposed project, 11.1 acres are considered to represent significant impacts.

- Construction of Levee Alignment 2 would result in the temporary loss of 7.2 acres of mixed willow exotic. The temporary loss of 7.2 acres of mixed willow exotic represents a significant impact that can be mitigated to a level of not significant.

- Construction of Levee Alignment 2 would result in the temporary loss of 0.7 acre of riparian woodland. The temporary loss of 0.7 acre of riparian woodland represents a significant impact that can be mitigated to a level of not significant.

- Construction of Alignment 2 would result in the temporary loss of 3.4 acres of open water/gravel, mud. The temporary loss of 3.4 acres of open water/gravel, mud represents a significant impact that can be mitigated to a level of not significant.

In addition to these significant impacts, the construction of Levee Alignment 2 would result in the temporary use of areas currently supporting Arundo and grass-forb mix, as well as disturbed/developed lands, (as shown in Appendix D). The first two vegetation types are not considered sensitive and this temporary use does not represent a significant adverse impact. In fact, temporary disturbance to areas supporting invasive exotic species such as Arundo, and replacement

with appropriate native vegetation represents a beneficial impact of the project. There would be no temporary impact to currently disturbed/developed areas.

Indirect Impacts to Vegetation - Levee Alignment 2.

Levee Alignment 2 is not expected to result in significant indirect effects on upland communities. The predominant indirect effects of constructing this alternative would result from modifications of flows in the Santa Margarita River which may affect wetland and riparian vegetation types. Potential significant effects of this modification are addressed under indirect impacts to wetlands for Levee Alignment 3.

Wildlife and Sensitive Species

Direct Impacts to General Wildlife - Levee Alignment 2.

Construction of Levee Alignment 2 would result in direct impacts to wildlife present within the vegetation/habitats subject to disturbance. These direct impacts are expected to be similar to those described previously for Levee Alignment 3. However, substantially more acreage would be subject to permanent and temporary disturbance as a result of construction of Levee Alignment 2, and increased impacts to general wildlife species would occur relative to Levee Alignment 3. Less acreage would be subject to permanent and temporary disturbance as a result of construction of Levee Alignment 2 relative to Levee Alignment 1.

Direct Impacts to Sensitive Wildlife - Levee Alignment 2.

Least Bell's Vireo. Construction of Levee Alignment 2 would result in the direct loss of occupied or occupiable breeding and foraging habitat of the least Bell's vireo. Construction activities are expected to permanently impact 7.9 acres of vireo habitat, and temporarily impact an additional 20.0 acres. Both permanent and temporary impacts to vireo habitat are expected to occur during a single breeding season (15 March through 1 September), with temporary impacts expected to occur over an additional five to ten breeding seasons as the impacted areas gradually regain the vegetation characteristics of occupiable vireo habitat. According to data gathered during 1995, the Santa Margarita floodplain supported 461 least Bell's vireos (comprised of nesting pairs, territorial males, and undetermined status males). Based on data gathered during 1996, there are 287 vireos (pairs or males) along the Santa Margarita River in the area of the proposed project. About 37 of these 287 made use of the area subject to direct permanent or temporary impacts as a result of Levee Alignment 2 construction, as shown on Figure 4.3-7.

The direct permanent disturbance to 7.9 acres of vireo habitat (consisting of 2.4 acres of Arundo, 2.3 acres of grass-forb mix, 3.0 acres of mixed millow exotic, and 0.2 acres of riparian woodland), and temporary disturbance to 20.0 acres of vireo habitat (consisting of 4.9 acres of Arundo, 7.2 acres of grass-forb mix, 7.2 acres of mixed willow exotic, and 0.7 acres of riparian woodland), will directly disturb a minimum of 37 vireos, likely through displacement. No vireos are expected to be killed outright during construction activities, because vegetation clearing will be accomplished prior to the breeding season. In addition, some of the approximately 35 vireos which are present within about 250 feet of the limits of proposed construction may be directly disturbed by noise and dust generated during construction activities. These direct impacts (consisting of loss of breeding and foraging habitat, displacement of individuals, and disturbance due to noise and dust) to breeding vireos are considered significant.

The magnitude of these direct impacts to vireos can be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of increasing the quality of currently degraded vegetation to replace the lost vireo habitat, and avoidance of vegetation clearance during the breeding season.

Southwestern Willow Flycatcher. Construction of Levee Alignment 2 would result in the direct loss of occupied or occupiable habitat of the southwestern willow flycatcher. According to data gathered during 1995, riparian vegetation along the Santa Margarita River supported ten pairs of flycatcher. Based on data gathered during 1996, there are five flycatcher territories along the Santa Margarita River in the area of the proposed project. None is located in areas subject to direct permanent or temporary impacts as a result of Levee Alignment 2 construction, as also shown on Figure 4.3-7. However, one flycatcher territory which is present within about 250 feet of the limits of proposed construction may be directly disturbed by noise and dust generated during construction activities. These direct impacts to flycatchers are considered significant.

The magnitude of these direct impacts to flycatchers can be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of increasing the quality of currently degraded vegetation to replace the lost flycatcher habitat.

Arroyo Toad. Construction of Levee Alignment 2 may result in direct disturbance to arroyo toads. Based on data gathered during 1996, arroyo toads occur along the Santa Margarita River from the eastern boundary of the base downstream to Stuart Mesa Road Bridge. Based on an evaluation of available toad location data, it appears that levee construction may not directly impact toad breeding pools. However, there is a potential for toad mortality by vehicle crushing in roadways and other construction areas. Without implementation of Best Management Practices, toads could be harmed from inadvertent fouling or pollution of the river water from accidental fluid spill or other

construction material discharge, and increased construction-related sedimentation. For example, concreting activities that result in concrete or affected water reaching toad breeding areas could affect an entire years reproductive output within a limited area downstream of the contamination site, due to changes in the pH.

These direct impacts to toad populations (through crushing and loss of larvae due to pollution and sedimentation) are considered significant.

The magnitude of these direct impacts to arroyo toads would be reduced to a level that is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of avoidance of construction activities during the toad breeding season (as practicable),the use of biological construction monitors to remove toads from harm's way in construction areas, and the use of Best Management Practices to minimize the amount of construction-related sedimentation and the potential for fouling or pollution.

Indirect Impacts to General Wildlife - Levee Alignment 2.

Construction of Levee Alignment 2 may result in indirect disturbance to general wildlife and habitat as a result of the altered hydrological regime in the area which will be isolated behind the levee and removed from the floodplain. These isolated riparian habitats (consisting of 20.8 acres of Arundo, 41.1 acres of mixed willow exotic, and 0.3 acres of open water/gravel, mud) will eventually change in character due to the lack of scour and deposition of sediment. The suite of wildlife species currently inhabiting these isolated habitats would then either acclimate to the gradual succession of early seral riparian scrub habitats to mature woodland habitats (in the case of habitat generalists), or would gradually emigrate from the area as habitat conditions change such that they could no longer be supported (in the case of habitat specialists). These wildlife habitat specialists would then be expected to be replaced by a suite of wildlife habitat specialists appropriate to more mature riparian vegetation types. This indirect impact to general wildlife species is not considered significant.

Indirect Impacts to Sensitive Wildlife - Levee Alignment 2.

Least Bell's Vireo and Southwestern Willow Flycatcher. Construction of Levee Alignment 2 may affect the distribution of least Bell's vireo and southwestern willow flycatcher as a result of isolation of the area behind the levee and its removal from the floodplain. These isolated habitats currently are occupied by about 25 least Bell's vireo, and all five of the willow flycatcher territories which may eventually change in character due to the lack of scour and deposition of sediment which is critical to sustaining and regenerating high quality vireo and flycatcher habitat. This potential eventual degradation and elimination of vireo and flycatcher habitat represents a significant indirect impact. The magnitude of this indirect impact to vireo and flycatcher can be reduced to a level that

is not significant through successful application of the mitigation measures identified in Section 4.3.3, consisting primarily of mechanical manipulation (as needed) of the vegetation isolated by the levee such that the functional value for high quality vireo and flycatcher habitat is maintained through time. While flycatchers may be affected, along the Santa Margarita River they appear to occur in more mature riparian habitats than do vireo (personal communication, Environmental Security, MCB Camp Pendleton, 1997). Whereas vireo tend to occur in more shrubby riparian vegetation, flycatchers make use of shrubby vegetation as well as large, mature willow trees. As such, flycatchers may do well within the isolated area, should the riparian vegetation mature into more woodland forms.

Arroyo Toad. Construction of Levee Alignment 2 may result in indirect disturbance to arroyo toads as a result of changes in the river. Any changes which would occur in the project area and which would negatively affect toads would likely be offset by changes which could positively affect toad habitat. The development of a mature riparian woodland in the area isolated behind the levee may continue to provide good (or better) toad habitat (personal communication, Environmental Security, MCB Camp Pendleton, 1997).

Wetlands. This analysis is based upon the recently completed delineation of waters of the United States and adjacent wetlands (Figures 4.3-7.1 through 4.3-7.3). All of the wetland acreage discussed below is also included in the vegetation/habitat acreages previously considered. The construction of Levee Alignment 2 would occur predominantly within the floodplain of the Santa Margarita River. Much of the affected vegetation and habitat is characterized as riparian and is dependent on water and the interaction of flowing water with the floodplain environment. The jurisdictional delineation for the project area evaluated the impacts to wetlands of 'Alternative 2' which includes Levee Alignment 2 and either of the Bridge Alignments A, B, or C.

Direct Impacts to Wetlands - "Alternative 2"

Implementation of "Alternative 2" would have direct adverse effects on a total of 48.7 acres of wetlands, as shown in Table 4.3.2-3. The delineation identified 30.5 acres of direct permanent impact to wetlands, plus an additional direct temporary impact to 18.2 acres of wetlands. The permanent and temporary loss of jurisdictional wetlands is a significant impact. The magnitude of this impact can be reduced to a level that is not significant.

Indirect Impacts to Wetlands - "Alternative 2"

Construction of "Alternative 2" will result in the full isolation (and loss) of 9.7 acres of wetlands. This loss is expected to be permanent. In addition, 32.9 acres will be partially isolated, as shown in Table 4.3.2-3. This partial isolation may represent a permanent impact, or the effect may occur on

a temporary basis. Additional discussion of project related indirect impacts to wetlands and waters of the United States are discussed under Levee Alignment 3.

In summary, construction of "Alternative 2" would result in direct permanent and temporary, as well as indirect permanent and temporary impacts to a total of 91.3 acres of wetlands. This impact is significant, but the magnitude can be reduced.

River Training Structures. The river training structures associated with Alternative Levee Alignment 2 include 6 spur dikes and silt fences located upstream of the Basilone Road Bridge on the floodplain southeast of the channel (Figure 4.3-4).

Vegetation

Direct Impacts to Vegetation - River Training Structures

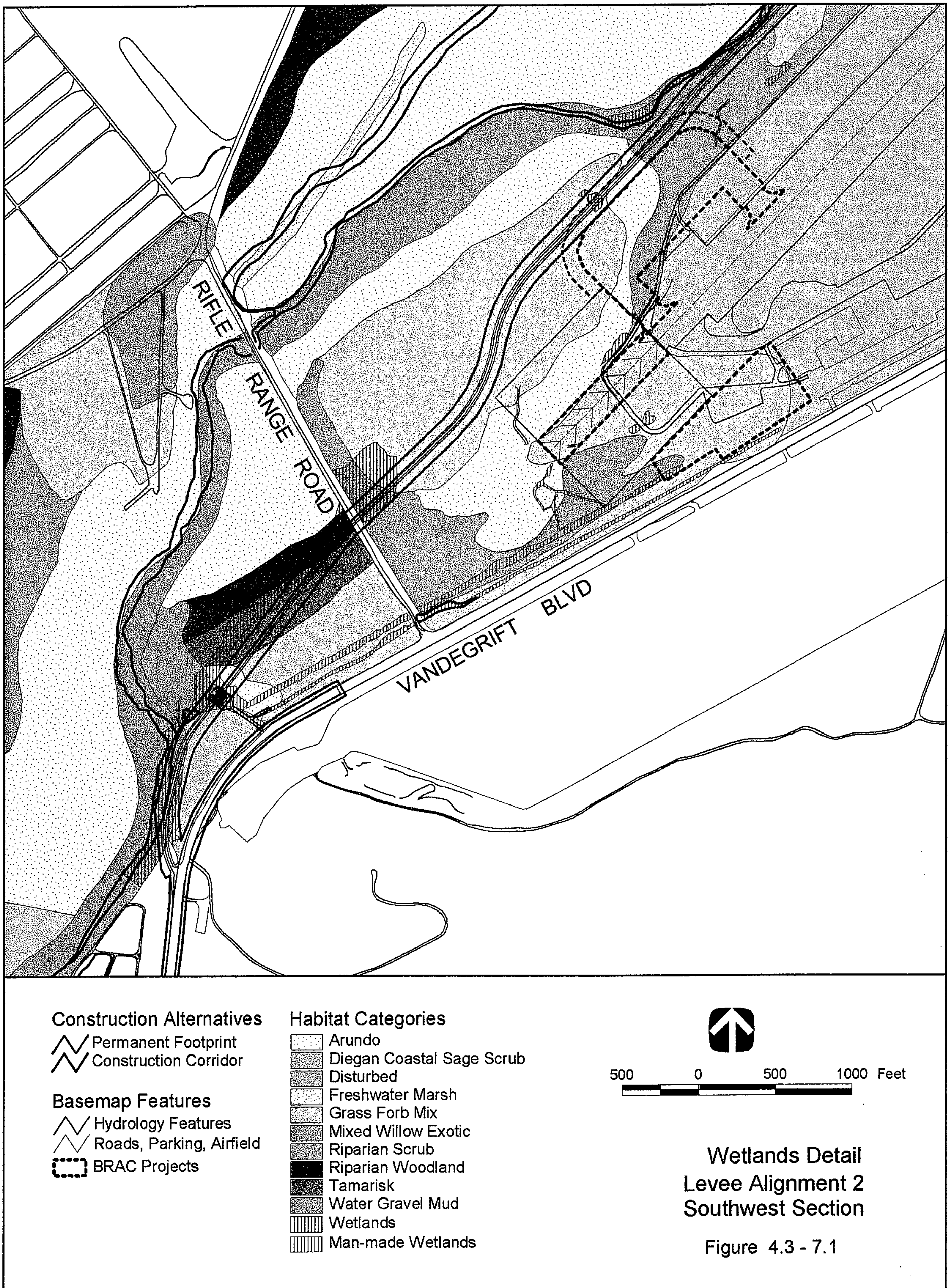
Permanent Impacts. Construction of the spur dikes and silt fences would result in permanent loss of 18.7 acres of vegetation with 9.4 acres of loss considered significant. Temporary loss of vegetation would total 11.4 acres of which 4.9 acres is considered to be significant.

Permanent habitat loss would occur within the spur dike footprint. Little permanent loss would be associated with the silt fences since the area required for the placement of poles and clearing of brush to stretch the geotextile would be small.

- Construction of the spur dikes and silt fences would result in the permanent loss of 0.5 acres of freshwater marsh. The permanent loss of 0.5 acre of freshwater marsh represents a significant impact that can be mitigated to a level that is not significant.

- Construction of the spur dikes and silt fences would result in the permanent loss of 7.2 acres of mixed willow exotic. The permanent loss of 7.2 acres of mixed willow exotic represents a significant impact that can be mitigated to a level that is not significant.

- Construction of the spur dikes and silt fences would result in the permanent loss of 1.7 acre of riparian scrub. The permanent loss of 1.7 acre of riparian scrub represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.



Wetlands Detail
Levee Alignment 2
Southwest Section

Figure 4.3 - 7.1

Construction Alternatives

- Permanent Footprint
- Construction Corridor

Basemap Features

- Hydrology Features
- Roads, Parking, Airfield
- BRAC Projects

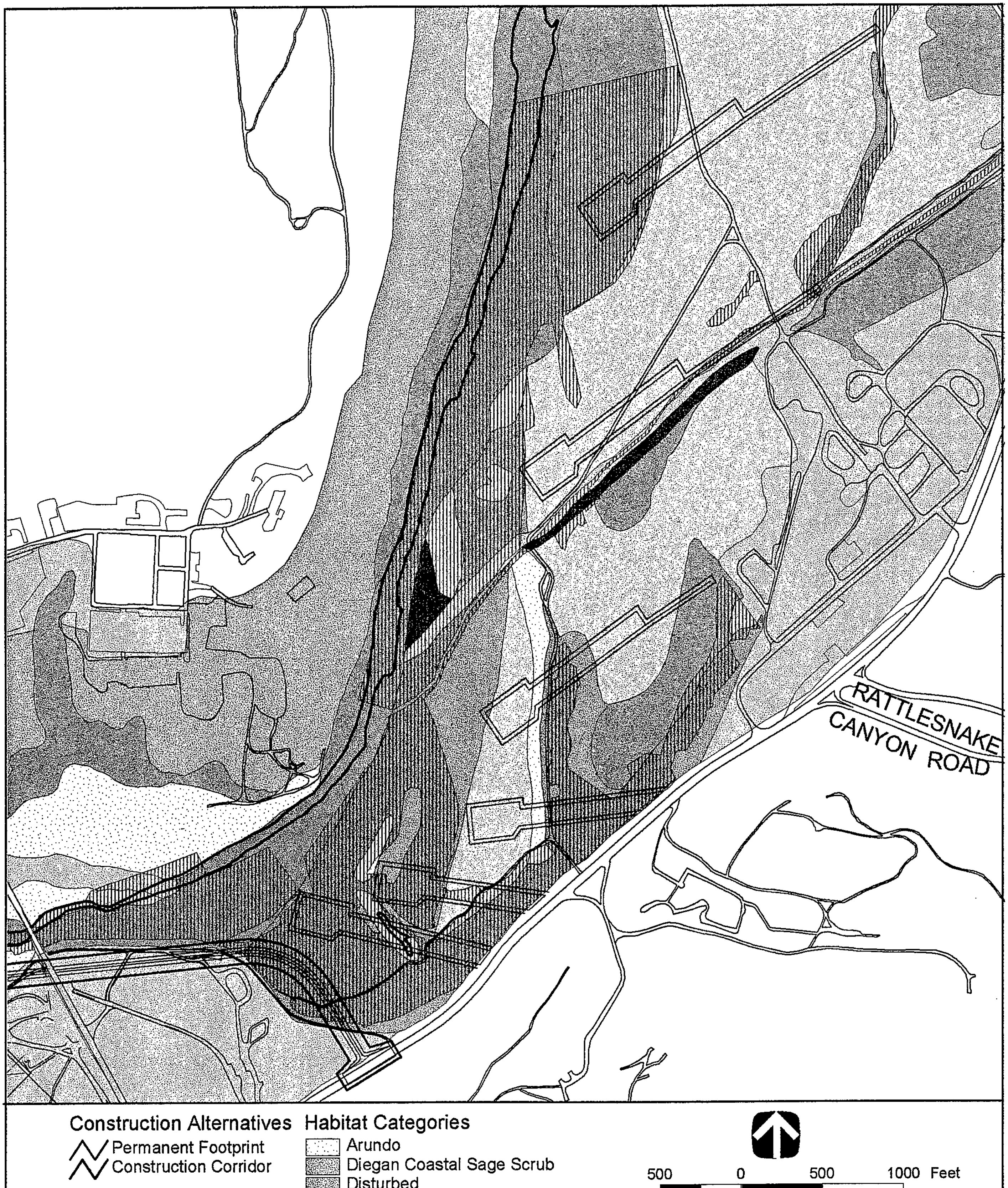
Habitat Categories

- Arundo
- Diegan Coastal Sage Scrub
- Disturbed
- Freshwater Marsh
- Grass Forb Mix
- Mixed Willow Exotic
- Riparian Scrub
- Riparian Woodland
- Tamarisk
- Water Gravel Mud
- Wetlands
- Man-made Wetlands

500 0 500 1000 Feet

Wetlands Detail
Levee Alignment 2
Mid Section

Figure 4.3 - 7.2



Wetlands Detail

Levee Alignment 2
Northeast Section

Figure 4.3 - 7.3

In addition to these significant impacts, the construction of the spur dikes and silt fences would result in the permanent loss of Arundo, grass-forb mix vegetation, and disturbed/developed lands (Appendix D). These vegetation types are not considered sensitive and their loss does not represent a significant impact.

Temporary Impacts. Temporary direct impacts to vegetation would result from the construction of the spur dikes and silt fences. Upon completion of construction, the temporarily affected area would be restored to the original vegetation type where appropriate, in a manner consistent with that described in the USFWS programatic riparian and estuarine Biological Opinion and MCB Camp Pendleton conservation plan. Areas characterized by existing habitat dominated by invasive exotics would be restored to appropriate native vegetation types. Revegetation following temporary impacts of low quality vegetation will result in a net benefit to the ecosystem. Of the total area temporarily affected by the proposed project, 4.9 acres are considered to represent significant impacts, as detailed below.

- Construction of the spur dikes and silt fences would result in the temporary loss of 0.2 acre of freshwater marsh. The temporary loss of 0.2 acre of freshwater marsh represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.

- Construction of the spur dikes and silt fences would result in the temporary loss of 3.6 acres of mixed willow exotic. The temporary loss of 5.6 acres of mixed willow exotic represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.

- Construction of the spur dikes and silt fences would result in the temporary loss of 1.1 acres of riparian scrub. The temporary loss of 1.1 acres of riparian scrub represents a significant impact. The magnitude of this direct impact can be reduced to a level that is not significant.

In addition to these significant impacts, the construction of Levee Alignment 2 would result in the temporary use of areas currently supporting Arundo and grass-forb mix, as well as disturbed/developed lands, (as shown in Appendix D). The first two vegetation types are not considered sensitive and this temporary use does not represent a significant adverse impact. In fact, temporary disturbance to areas supporting invasive exotic species such as Arundo, and replacement with appropriate native vegetation represents a beneficial impact of the project. There would be no temporary impact to currently disturbed/developed areas (by definition).

Indirect Impacts. Indirect impacts to biological resources resulting from construction of the river training structures are discussed in detail under Alternative 1A.

Stormwater Management System. Impacts to biological resources resulting from the construction of the Stormwater Management System associated with Alternative 2A are the same as those described for Alternative 3A.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. Impacts to biological resources resulting from the construction of Bridge Alignment A are the same as those described for Alternative 3A.

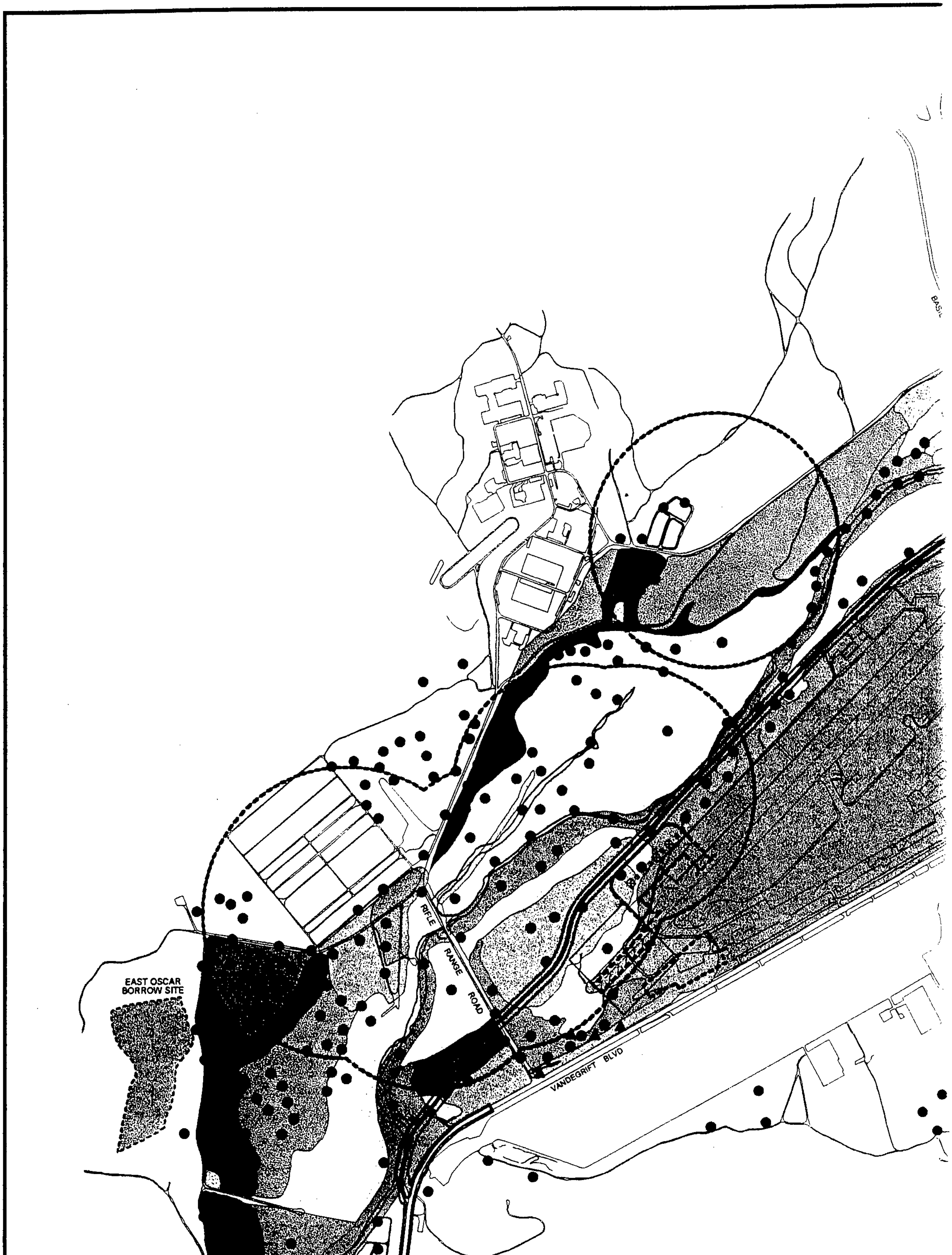
4.3.2.8 Alternative 2B [Levee Alignment 2 + Bridge Alignment B]

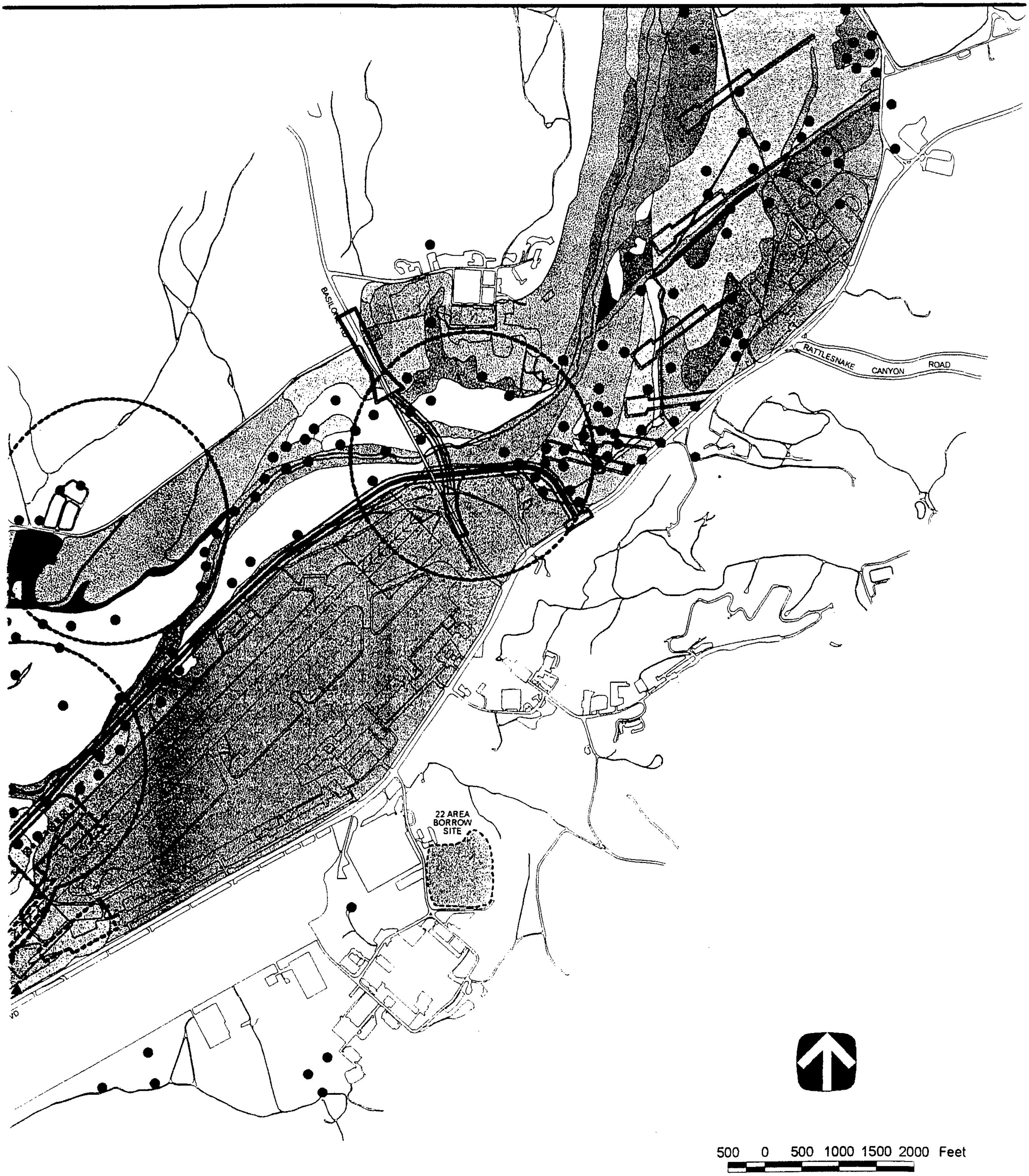
Impacts of Alternative 2B on biological resources are presented in Table 4.3.4-8 and Appendix D.

Levee Alignment 2. Impacts to biological resources resulting from the construction of Levee Alignment 2 are the same as those described for Alternative 2A (Figure 4.3-8).

Stormwater Management System. Impacts to biological resources resulting from the construction of the Stormwater Management System associated with Alternative 2B are the same as those described for Alternative 3A.

Bridge Alignment B-East Curve Alignment. Impacts to biological resources resulting from the construction of Bridge Alignment B are the same as those described for Alternative 3B.


EAST OSCAR
BORROW SITE
RIFLE
RANGE
ROAD
VANDEGRIFT BLVD


RATTLESNAKE CANYON ROAD
22 AREA BORROW SITE
500 0 500 1000 1500 2000 Feet

Construction Alternatives
- Permanent Footprint
- Construction Corridor

Basemap Features
- Hydrology Features
- Roads, Parking, Airfield
- Borrow Site
- BRAC Projects

Habitat Categories
- Arundo
- Diegan Coastal Sage Scrub
- Disturbed
- Freshwater Marsh
- Grass Forb Mix
- Mixed Willow Exotic
- Riparian Scrub
- Riparian Woodland
- Tamarisk
- Water Gravel Mud

Species
- Southwestern Flycatcher
- Least Bell's Vireo
- Arroyo Southwestern Toad (500M Buffer)

Alternative 2B
Habitat Impact and
Sensitive Species

Figure 4.3 - 8

4.3.2.9 Alternative 2C [Levee Alignment 2 + Bridge Alignment C]

Impacts of Alternative 2C on biological resources are presented in Table 4.3.4-9 and Appendix D.

Levee Alignment 2. Impacts to biological resources resulting from the construction of Levee Alignment 2 are the same as those described for Alternative 2A (Figure 4.3-9).

Stormwater Management System. Impacts to biological resources resulting from the construction of the Stormwater Management System associated with Alternative 2C are the same as those described for Alternative 3A.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Impacts to biological resources resulting from the construction of Bridge Alignment C are the same as those described for Alternative 3C.

4.3.2.10 No Action Alternative

If the proposed flood control levee and the associated stormwater management system are not constructed, then the project area will continue to experience periodic flooding. This would not result in a significant impact on biological habitats and sensitive species because the flood regime is part of the natural successional ecology of these biological resources. The behavior of the river system outside the project reach is virtually unaffected by any of the three alternatives.

Under the No Action Alternative, the temporary bridge in the existing Basilone Road alignment would continue to provide north-south access for Camp Pendleton. This would not result in any significant impacts to biological resources beyond temporary disturbance due to bridge maintenance. The current situation in which the existing bridge further constricts a natural constriction point in the river would continue.

4.3.3 Analysis of Significance

The implementation of any of the nine alternatives would result in significant impacts to sensitive habitats (including wetlands) or endangered species.

4.3.4 Mitigation Measures

To establish requirements for endangered species mitigation, a review of the USFWS Programmatic Riparian Biological Opinion (USFWS, 1994) was conducted. The following discussion presents a summary of pertinent issues from the Programmatic Riparian Biological Opinion and the P-010 and P-030 projects. The Programmatic Riparian Biological Opinion describes the effects of the construction, operation, and maintenance of both the Santa Margarita Levee project and the replacement of Basilone Bridge. Direct and indirect impacts were evaluated.

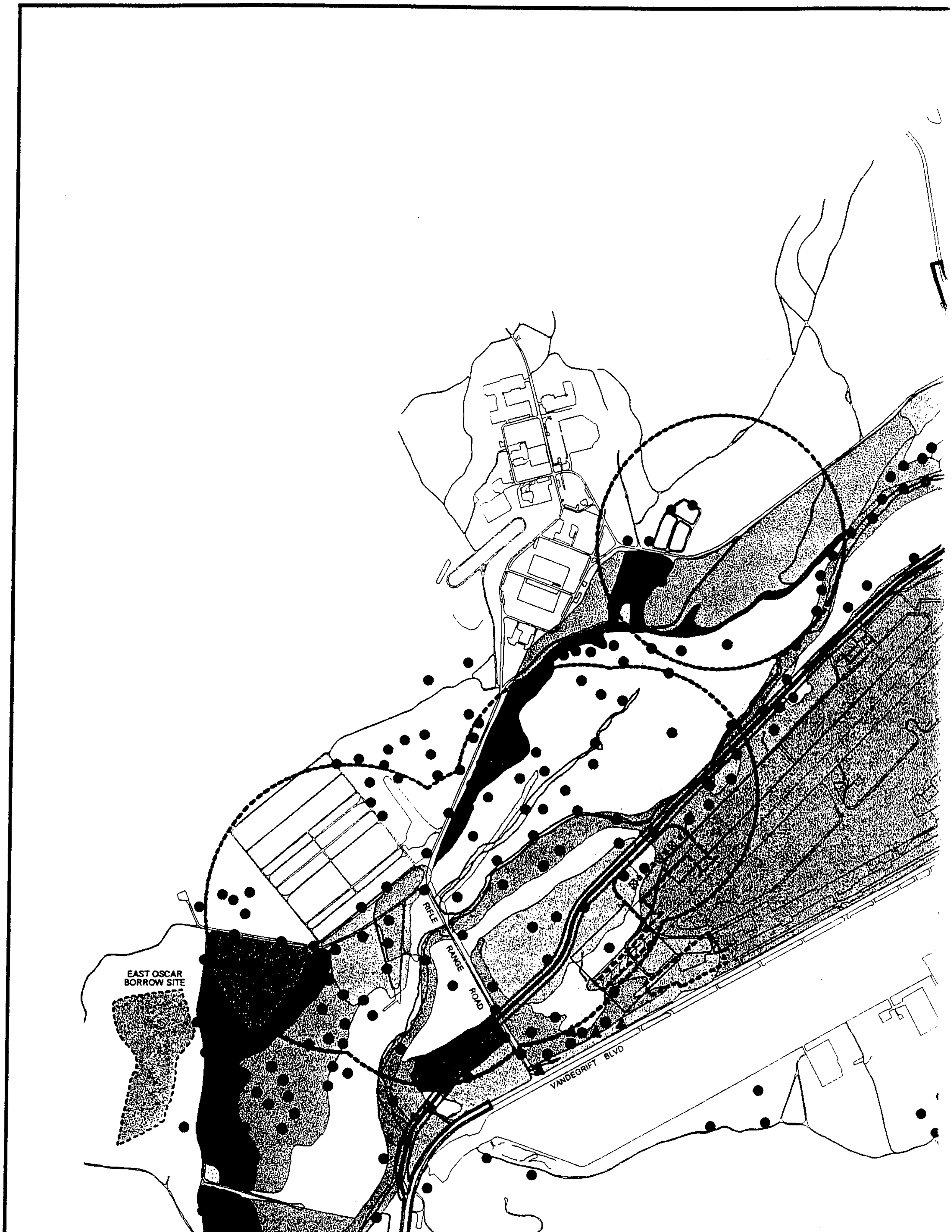
Preliminary impacts were calculated and included in the USFWS Programmatic Riparian Biological Opinion for construction of the levee in the Santa Margarita River watershed. It was estimated that a permanent loss of 32 acres of wetland habitat would result from the original levee design proposed in the USFWS Programmatic Riparian Biological Opinion. This included approximately 8 acres of riparian woodland, 14 acres of mixed willow exotic, and 10 acres of Arundo. As mapped in the Biological Assessment from 1994 surveys, southwestern willow flycatchers and least Bell's vireos made use of the area to be directly affected by the permanent footprint of the levee. Arroyo toads had also been recorded from the area of the proposed levee, near the existing Basilone Bridge. Additional direct, but temporary (5-10 years), impacts to 10 acres of wetlands, outside the footprint of the levee, were also assumed to be impacted during project construction. In addition, an area of approximately 1 acre would also be impacted by construction of the Basilone Road Bridge.

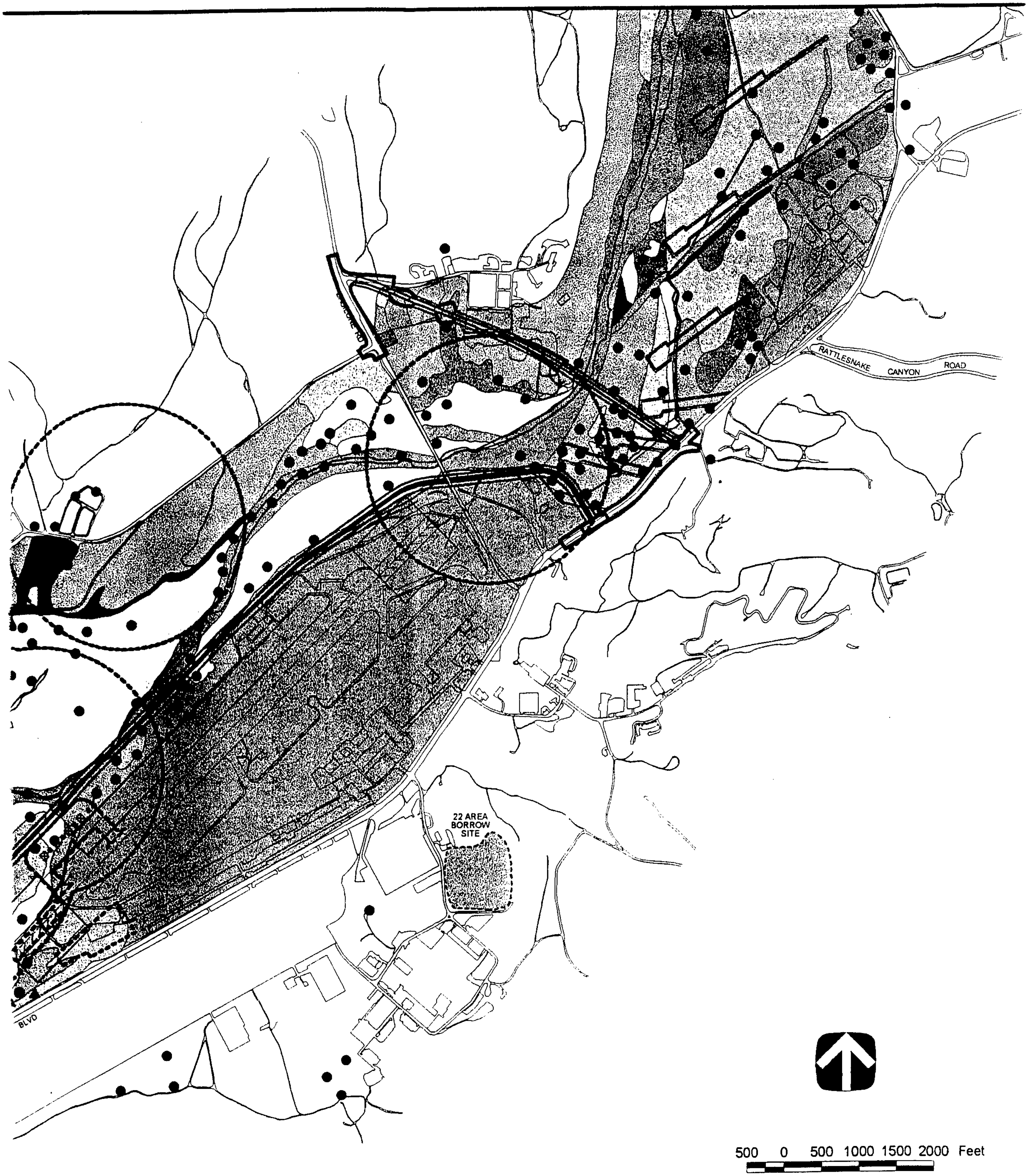
These impacts to endangered species habitat as calculated for the currently proposed levee and bridge replacement project are less than those calculated in the USFWS Programmatic Riparian Biological Opinion and Biological Assessment, due to changes in levee design.

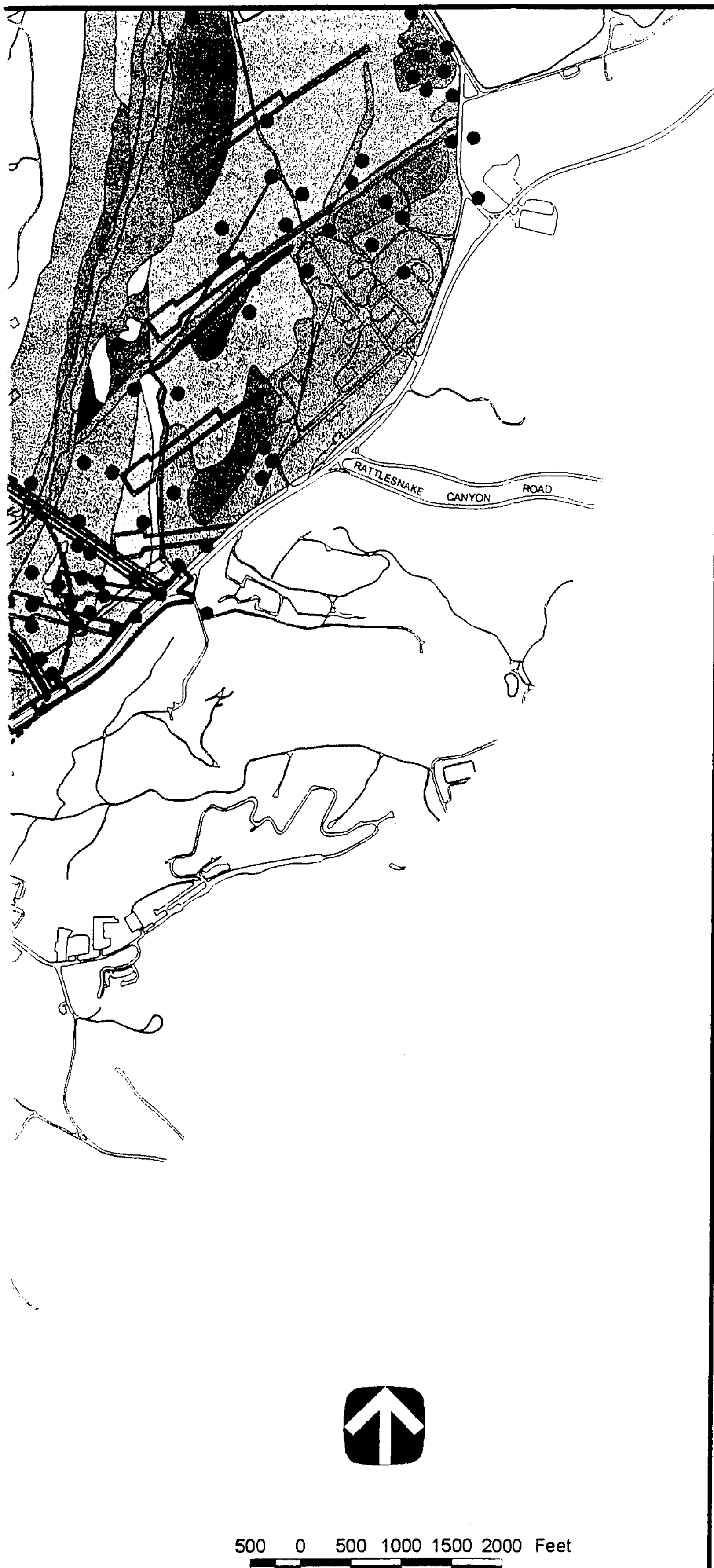
Mitigation Compensation Procedures

During the formulation of the mitigation and compensation procedures set forth in this environmental document, guidance was sought from the USFWS Programmatic Riparian Biological Opinion. This Biological Opinion provides proposed procedures to administer MCB Camp Pendleton activities, and mitigation requirements for direct permanent and temporary losses of habitat. At the time of its development, MCB Camp Pendleton expected this Biological Opinion would facilitate the mitigation of unavoidable adverse impacts to threatened and endangered riparian species as a result of the Santa Margarita River levee project, because it set forth agreed upon procedures which would allow the least biologically damaging project alternative to proceed, while providing a high level of protection and compensation for sensitive resources. This perception has not changed, and the following mitigation section tiers off the program described in the USFWS Programmatic Riparian Biological Opinion.

Proposed habitat management for temporary impacts (involving monitoring and performing exotic species removal) would extend for five years, to facilitate natural revegetation. Creation of wetlands is not proposed as part of this Biological Opinion although supplemental planting in the exotic vegetation removal (habitat enhancement) strategy is not precluded. Federal mitigation policies established pursuant to the goals and objectives of the Clean Water Act recommend that unavoidable wetland loss be mitigated by in-kind wetland creation or restoration with equal value and function. The endangered species compensation procedures outlined by the Programmatic Riparian Biological Opinion (page 21) are not wholly in accord with Clean Water Act policies. The Proposed Action and any associated wetlands impacts are being coordinated with the ACOE under an application process in accordance with the Clean Water Act (Section 404 permit). The BA and USFWS Programmatic Riparian Biological Opinion established mitigation compensation requirements for


EAST OSCAR
BORROW SITE
RIFLE
RANGE
ROAD
VANDEGRIFT BLVD


RATTLESNAKE CANYON ROAD
22 AREA BORROW SITE
BLVD
500 0 500 1000 1500 2000 Feet



Construction Alternatives
Permanent Footprint
Construction Corridor

Basemap Features
Hydrology Features
Roads, Parking, Airfield
Borrow Site
BRAC Projects

Habitat Categories
Arundo
Diegan Coastal Sage Scrub
Disturbed
Freshwater Marsh
Grass Forb Mix
Mixed Willow Exotic
Riparian Scrub
Riparian Woodland
Tamarisk
Water Gravel Mud

Species
Southwestern Flycatcher
Least Bell's Vireo
Arroyo Southwestern Toad (500M Buffer)

Alternative 2C
Habitat Impact and
Sensitive Species

Figure 4.3 - 9

endangered species habitat. The following mitigation requirements were identified as a 'special case' for the proposed levee project in the USFWS Programmatic Riparian Biological Opinion, to compensate for permanent disturbance to endangered species habitat:

- 3:1 (3 acres of exotic invasive plant eradication, plus revegetation with native species for loss of 1 acre of habitat; or 10 acres of exotic invasive plant eradication without revegetation with native species for loss of 1 acre of habitat) for permanent impacts to endangered species habitat including riparian woodland, open water/gravel, mud; riparian scrub, freshwater marsh, mixed willow exotic, and grass-forb mix vegetation types.

- 1.1:1 for permanent impacts to Arundo and tamarisk vegetation types. Based on the USFWS Programmatic Riparian Biological Opinion, these habitat types are identified as unsuitable for endangered species management efforts. Thus the standard programmatic ecosystem compensation requirements are being used.

The following mitigation ratios would be required to compensate for temporary disturbance to endangered species habitat:

- 2:1 for temporary impacts to riparian woodland vegetation.

- 1.5:1 for temporary impacts to open water/gravel, mud habitat. Based on the USFWS Programmatic Riparian Biological Opinion, temporary impacts to these habitats are being compensated for at 75 percent of the standard programmatic ecosystem compensation requirements (2:1), due to disturbance in these disturbance-prone habitats lasting only through approximately three breeding seasons.

- 1.5:1 for temporary impacts to riparian scrub and freshwater marsh vegetation types.

- 1.1:1 for temporary impacts to mixed willow exotic, grass-forb mix, Arundo, and tamarisk vegetation types.

- 0.83:1 for temporary impacts to grass-forb mix vegetation. Based on the USFWS Programmatic Riparian Biological Opinion, temporary impacts to this habitat are being compensated for at 75 percent of the standard programmatic ecosystem compensation requirements (1.1:1), due to disturbance lasting only through approximately three breeding seasons. The grass component of this vegetation can become replaced fairly quickly.

- 0.55:1 for temporary impacts to Arundo and tamarisk vegetation. Based on the USFWS Programmatic Riparian Biological Opinion, temporary impacts to these two vegetation types are being compensated for at 50 percent of the standard programmatic ecosystem

compensation requirements (1.1:1), because the post-construction condition (that is, after removal of exotics and replacement with natives) the habitat value will be higher or equal to the existing exotic vegetation. Therefore, disturbance will occur only over the two year construction period.

Mitigation and compensation requirements for permanent or temporary impacts to Diegan coastal sage scrub were not established in the Programmatic Riparian Biological Opinion. Aboard MCB Camp Pendleton, occupied coastal sage scrub impacts are typically compensated through the use of a 2:1 ratio where 2 acres of coastal sage scrub are enhanced (through removal of exotic invasive plants or revegetation) for 1 acre disturbed when the coastal sage scrub represents occupied habitat for coastal California gnatcatchers. When gnatcatchers are not present, the compensation typically consists of enhancing the area disturbed such that the habitat value is greater than at the time of disturbance (referred to as 1:1 compensation for convenience).

Wetlands. Mitigation and compensation requirements for permanent or temporary direct impacts to wetlands or waters of the U.S. were not established in the Programmatic Riparian Biological Opinion. Direct impacts are typically compensated through the use of a 3:1 ratio where 3 acres of wetlands are created for 1 acre disturbed to ensure a no net loss of wetlands.

Mitigation and compensation requirements for permanent or temporary indirect impacts to wetlands or waters of the U.S. as a result of full isolation behind the levee or partial isolation due to the spur dike configuration will be identified through the continuing coordination with the ACOE.

The USFWS Programmatic Riparian Biological Opinion (page 22) indicated that indirect impacts that cannot be measured would go unmitigated. The indirect effects of this project have been addressed by incorporating stringent management and monitoring measures throughout the design, development and construction of the levee and bridge replacement project. MCB Camp Pendleton has continued to examine and develop the least biologically damaging levee and bridge design. In addition, once an alternative has been selected, the loss of endangered species and habitat will be minimized to the greatest extent feasible through limiting the extent and nature of brush and land clearing activities, through the removal of invasive exotic plants and replacement with native vegetation, and through monitoring the effectiveness of the mitigation measures.

Guidelines for Implementation

The USFWS Programmatic Riparian Biological Opinion identified certain programmatic procedures that each project covered must incorporate. The following is an assessment of this project and conformance with the guidelines follow:

1. NEPA planning and review process shall be followed.

   The preparation of this EIS conforms with the NEPA planning and review process.

2. New construction sites will be identified in the following priority: (1) Previously disturbed; (2) exotic dominated habitat; (3) other habitat; (4) riparian scrub, mixed or woodland habitat; and (5) riparian woodland habitat. The impacts to freshwater marsh and open water/gravel, mud areas will be minimized to the extent practical.

   The proposed levee design was designed with several alternatives according to engineering criteria and the avoidance of sensitive habitats. To the maximum extent feasible, each alternative was selected to avoid wetlands and high quality sensitive habitat.

3. Funding for habitat compensation will be identified as part of construction cost during planning process. To the maximum extent possible, funds for habitat compensation will be secured before contracts are awarded.

   Department of Navy will ensure through its MILCON program that adequate funding is available for habitat compensation as part of the overall construction cost.

4. The NEPA process will be used to assess biological impacts.

   The preparation of this EIS conforms with the NEPA requirements of assessing biological impacts. This EIS quantifies the magnitude of the impacts from the levee to biological resources.

5. Conservation goals addressing habitat protection shall be met.

   Each proposed alternative was chosen with the intent of protecting the maximum amount of habitat to the extent feasible. With the proposed mitigation measures, none of the alternatives will compromise the riparian habitat goals for MCB Camp Pendleton.

6. Compensation formula shall be followed.

   Adequate compensation would be provided for the impacts occurring from the Proposed Action according to the compensation formula provided in the Programmatic Riparian Biological Opinion and presented in Tables 4.3-1 through 4.3-5.

Table 4.3.4-1

Fish and Wildlife Habitat Impacts and Compensation Requirements for Direct Impacts Associated with Alternative 3A

Vegetation/Habitat Type	Permanent Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Temporary Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Total Mitigation (Acres)
Arundo	3.4	1.1	3.7	7.8	0.55	4.3	**8.0**
Diegan Sage Scrub	0.8	2	1.6	0.4	1	0.4	**2.0**
Freshwater Marsh **							
Grass-Forb Mixed **	4.7	3	14.1	10.8	0.83	8.9	**23.0**
Mixed Willow Exotic **	4.1	3	12.3	8.6	1.1	9.5	**21.8**
Riparian Scrub **	0.1	3	0.3	0.4	1.5	0.6	**0.9**
Riparian Woodland **							
Tamarisk							
Open Water/Open Wash **	1.7	3	5.1	3.5	1.5	5.3	**10.4**
Subtotal	14.8		37.1	31.5		29.0	66.1
Disturbed/Developed	13.7	0	0	11.6	0	0	0
Total	**28.5**		**37.1**	**43.1**		**29.0**	**66.1**

* Compensation ratio identified on page 19 of the Biological Opinion (1-6-95-F-02): "In the extraordinary case of the SMR Flood Control Levee project, the Base has agreed to mitigate the direct loss of habitat value for listed species by enhancing severely degraded riparian habitat at a ratio of 3:1, including revegetation", and in Term and Condition No. 5(d) on Page 36.

**Identified as habitat for least Bell's vireo, southwestern willow flycatcher, or arroyo toad in Appendix 1 of the Biological Opinion (pages 50-53).

Table 4.3.4-2

Fish and Wildlife Habitat Impacts and Compensation Requirements for Direct Impacts Associated with Alternative 3B

Vegetation/Habitat Type	Permanent Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Temporary Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Total Mitigation (Acres)
Arundo	4.1	1.1	4.5	7.8	0.55	4.3	**8.8**
Diegan Coastal Sage Scrub	1.2	2	2.4	0.5	1	0.5	**2.9**
Freshwater Marsh **							
Grass-Forb Mix **	4.7	3	14.1	10.8	0.83	9.0	**23.1**
Mixed Willow Exotic **	4.2	3	12.6	8.7	1.1	9.6	**22.2**
Riparian Scrub **	0.5	3	1.5	0.5	1.5	0.7	**2.2**
Riparian Woodland **							
Tamarisk							
Open Water/gravel,mud **	1.9	3	5.7	3.7	1.5	5.5	**11.2**
Subtotal	16.6		40.8	32.0		29.6	**70.4**
Disturbed/Developed	13.2	0	0	12.0	0	0	**0**
Total	**29.8**		**40.8**	**44.0**		**32.0**	**70.4**

* Compensation ratio identified on page 19 of the Biological Opinion (1-6-95-F-02): "In the extraordinary case of the SMR Flood Control Levee project, the Base has agreed to mitigate the direct loss of habitat value for listed species by enhancing severely degraded riparian habitat at a ratio of 3:1, including revegetation", and in Term and Condition No. 5(d) on Page 36.

**Identified as habitat for least Bell's vireo, southwestern willow flycatcher, or arroyo toad in Appendix 1 of the Biological Opinion (pages 50-53).

Table 4.3.4-3

Fish and Wildlife Habitat Impacts and Compensation Requirements for Direct Impacts Associated with Alternative 3C

Vegetation/Habitat Type	Permanent Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Temporary Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Total Mitigation (Acres)
Arundo	3.2	1.1	3.5	6.4	0.55	3.5	**7.0**
Diegan Coastal Sage Scrub	2.3	2	4.6	2.4	1	2.4	**7.0**
Freshwater Marsh **							
Grass-Forb Mix **	5.0	3	15.0	11.7	0.83	9.7	**24.7**
Mixed Willow Exotic **	5.1	3	15.3	11.1	1.1	12.2	**27.5**
Riparian Scrub **	0.8	3	2.4	0.4	1.5	0.6	**3.0**
Riparian Woodland **							
Tamarisk							
Open Water/gravel, mud **	1.9	3	5.7	3.8	1.5	5.7	**11.4**
Subtotal	18.3		46.5	35.8		34.1	**80.6**
Disturbed/Developed	13.6	0	0	12.2	0	0	**0**
Total	**31.9**		**46.5**	**48.0**		**34.1**	**80.6**

* Compensation ratio identified on page 19 of the Biological Opinion (1-6-95-F-02): "In the extraordinary case of the SMR Flood Control Levee project, the Base has agreed to mitigate the direct loss of habitat value for listed species by enhancing severely degraded riparian habitat at a ratio of 3:1, including revegetation", and in Term and Condition No. 5(d) on Page 36.
**Identified as habitat for least Bell's vireo, southwestern willow flycatcher, or arroyo toad in Appendix 1 of the Biological Opinion (pages 50-53).

Table 4.3.4-4

Fish and Wildlife Habitat Impacts and Compensation Requirements for Direct Impacts Associated with Alternative 1A

Vegetation/Habitat Type	Permanent Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Temporary Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Total Mitigation (Acres)
Arundo	7.1	1.1	7.8	7.8	0.55	4.3	**12.1**
Diegan Coastal Sage Scrub	21.1	2	42.2	0.4	1	0.4	**42.6**
Freshwater Marsh **	0.3	3	0.9	0.3	1.5	0.5	**1.4**
Grass-Forb Mix **	15.5	3	46.5	16.7	0.83	13.9	**60.4**
Mixed Willow Exotic **	13.9	3	41.7	13.1	1.1	14.4	**56.1**
Riparian Scrub **	5.4	3	16.2	2.3	1.5	3.5	**19.7**
Riparian Woodland **	0.8	3	2.4	0.9	2	1.8	**4.2**
Tamarisk	1.6	1.1	1.8	2.8	1.1	3.1	**4.9**
Open Water/gravel, mud **	5.7	3	17.1	4.3	1.5	6.5	**23.6**
Subtotal	71.4		176.6	48.6		48.4	**225.0**
Disturbed/Developed	15.9	0	0	13.7	0	0	0
Total	**87.3**		**176.6**	**62.3**		**48.4**	**225.0**

* Compensation ratio identified on page 19 of the Biological Opinion (1-6-95-F-02): "In the extraordinary case of the SMR Flood Control Levee project, the Base has agreed to mitigate the direct loss of habitat value for listed species by enhancing severely degraded riparian habitat at a ratio of 3:1, including revegetation", and in Term and Condition No. 5(d) on Page 36.
**Identified as habitat for least Bell's vireo, southwestern willow flycatcher, or arroyo toad in Appendix 1 of the Biological Opinion (pages 50-53).

Table 4.3.4-5

Fish and Wildlife Habitat Impacts and Compensation Requirements for Direct Impacts Associated with Alternative 1B

Vegetation/Habitat Type	Permanent Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Temporary Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Total Mitigation (Acres)
Arundo	7.8	1.1	8.6	7.8	0.55	4.3	**12.9**
Diegan Coastal Sage Scrub	21.5	2	43.0	0.5	1	0.5	**43.5**
Freshwater Marsh **	0.3	3	0.7	0.3	1.5	0.5	**1.2**
Grass-Forb Mix **	15.5	3	46.5	16.7	0.83	13.9	**60.4**
Mixed Willow Exotic **	14.0	3	42.0	13.2	1.1	14.5	**56.5**
Riparian Scrub **	5.8	3	17.4	2.4	1.5	3.6	**21.0**
Riparian Woodland **	0.8	3	2.4	0.9	2	1.8	**4.2**
Tamarisk	1.6	1.1	1.8	2.8	1.1	3.0	**4.8**
Open Water/gravel, mud **	5.9	3	17.7	4.5	1.5	6.8	**24.5**
Subtotal	73.2		180.1	49.1		48.9	**229.0**
Disturbed/Developed	15.4	0	0	14.1	0	0	**0**
Total	**88.6**		**180.1**	**63.2**		**48.9**	**229.0**

* Compensation ratio identified on page 19 of the Biological Opinion (1-6-95-F-02): "In the extraordinary case of the SMR Flood Control Levee project, the Base has agreed to mitigate the direct loss of habitat value for listed species by enhancing severely degraded riparian habitat at a ratio of 3:1, including revegetation", and in Term and Condition No. 5(d) on Page 36.
**Identified as habitat for least Bell's vireo, southwestern willow flycatcher, or arroyo toad in Appendix 1 of the Biological Opinion (pages 50-53).

7. No construction shall occur in occupied riparian habitat during the breeding season to the maximum extent feasible.

   All clearing and grubbing will be conducted outside the breeding season. Construction within the initially cleared construction zone will occur year round.

8. No habitat shall be cleared during the breeding season. Cutting or mowing will be used in place of blading or uprooting vegetation whenever practical.

   Habitat is not proposed to be cleared during the breeding season. To the greatest extent practicable, initial clearing shall use cutting and mowing instead of blading.

9. Temporary affected habitat will be treated for a minimum of 5 years for weed control; compensation is required for impacts extending beyond the breeding season.

   MCB Camp Pendleton will be responsible for ensuring that adequate compensation is met for impacts extending beyond the breeding season.

Project- and Alternative-Specific Mitigation

Direct impacts would occur to a variety of wetlands and several sensitive habitat communities as a result of the proposed project. These habitats include riparian scrub, riparian woodland, mixed willow exotic, open water/open wash and Diegan coastal sage scrub. Indirect impacts associated with construction will also occur as the result of construction activities. The direct impacts to biological resources, which includes sensitive species habitat and wetlands, and mitigation requirements utilizing compensation requirements established in the USFWS Programmatic Riparian Biological Opinion are presented separately for each alternative in Tables 4.3.4-1 through 4.3.4-9.

These direct impacts to endangered species are reduced to levels less than significant through the incorporation of the mitigation measures identified in the USFWS Programmatic Riparian Biological Opinion (1-6-95-F-02) (USFWS, 1995) for basewide impacts to endangered species in riparian and estuarine habitats.

In accordance with the criteria provided in the USFWS Programmatic Riparian Biological Opinion, MCB Camp Pendleton would implement the following endangered species mitigation measures:

1. Implement mitigation ratios and an invasive exotic plant control program following those guidelines outlined in the USFWS Programmatic Riparian Biological Opinion (USFWS, 1995).

Table 4.3.4-6

Fish and Wildlife Habitat Impacts and Compensation Requirements for Direct Impacts Associated with Alternative 1C

Vegetation/Habitat Type	Permanent Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Temporary Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Total Mitigation (Acres)
Arundo	6.9	1.1	7.6	6.4	0.55	3.5	**11.1**
Diegan Coastal Sage Scrub	22.6	2	45.2	2.4	1	2.4	**47.6**
Freshwater Marsh **	0.3	3	1.0	0.3	1.5	0.5	**1.5**
Grass-Forb Mixed **	15.8	3	47.4	17.6	0.83	14.6	**62.0**
Mixed Willow Exotic **	14.9	3	44.7	15.6	1.1	17.2	**61.9**
Riparian Scrub **	6.1	3	18.3	2.3	1.5	3.5	**21.8**
Riparian Woodland **	0.8	3	2.4	0.9	2	1.8	**4.2**
Tamarisk	1.6	1.1	1.8	2.8	1.1	3.1	**4.9**
Open Water/gravel, mud **	5.9	3	17.7	4.6	1.5	6.9	**24.6**
Subtotal	74.9		186.1	52.9		53.5	**239.6**
Disturbed/Developed	15.8	0	0	14.3	0	0	**0**
Total	**90.7**		**186.1**	**67.2**		**53.5**	**239.6**

* Compensation ratio identified on page 19 of the Biological Opinion (1-6-95-F-02): "In the extraordinary case of the SMR Flood Control Levee project, the Base has agreed to mitigate the direct loss of habitat value for listed species by enhancing severely degraded riparian habitat at a ratio of 3:1, including revegetation", and in Term and Condition No. 5(d) on Page 36.
**Identified as habitat for least Bell's vireo, southwestern willow flycatcher, or arroyo toad in Appendix 1 of the Biological Opinion (pages 50-53).

Table 4.3.4-7

Fish and Wildlife Habitat Impacts and Compensation Requirements for Direct Impacts Associated with Alternative 2A

Vegetation/Habitat Type	Permanent Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Temporary Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Total Mitigation (Acres)
Arundo	3.2	1.1	3.5	6.4	0.55	3.5	**7.0**
Diegan Coastal Sage Scrub	21.1	2	42.2	0.4	1	0.4	**42.6**
Freshwater Marsh **	0.5	3	1.5	0.2	1.5	0.3	**1.8**
Grass-Forb Mixed **	11.8	3	35.4	14.0	0.83	11.6	**47.0**
Mixed Willow Exotic **	10.2	3	30.6	10.8	1.1	11.9	**42.5**
Riparian Scrub **	4.9	3	14.7	1.5	1.5	2.3	**17.0**
Riparian Woodland **	0.2	3	0.6	0.7	2	1.4	**2.0**
Tamarisk	0.6	1.1	0.7	2.2	1.1	2.4	**3.1**
Open Water/gravel, mud **	2.6	3	7.8	3.7	1.5	5.6	**13.4**
Subtotal	55.1		137.0	39.9		39.4	**176.4**
Disturbed/Developed	8.0	0	0	12.5	0	0	**0**
Total	**63.1**		**137.0**	**52.4**		**39.4**	**176.4**

* Compensation ratio identified on page 19 of the Biological Opinion (1-6-95-F-02): "In the extraordinary case of the SMR Flood Control Levee project, the Base has agreed to mitigate the direct loss of habitat value for listed species by enhancing severely degraded riparian habitat at a ratio of 3:1, including revegetation", and in Term and Condition No. 5(d) on Page 36.

**Identified as habitat for least Bell's vireo, southwestern willow flycatcher, or arroyo toad in Appendix 1 of the Biological Opinion (pages 50-53).

Table 4.3.4-8

Fish and Wildlife Habitat Impacts and Compensation Requirements for Direct Impacts Associated with Alternative 2B

Vegetation/Habitat Type	Permanent Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Temporary Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Total Mitigation (Acres)
Arundo	3.9	1.1	4.3	6.4	0.55	3.5	**7.8**
Diegan Coastal Sage Scrub	21.5	2	43.0	0.5	1	0.5	**43.5**
Freshwater Marsh **	0.5	3	1.5	0.2	1.5	0.3	**1.8**
Grass-Forb Mixed **	11.8	3	35.4	14.0	0.83	11.6	**47.0**
Mixed Willow Exotic **	10.3	3	0.9	10.9	1.1	12.0	**12.9**
Riparian Scrub **	5.3	3	15.9	1.6	1.5	2.4	**18.3**
Riparian Woodland **	0.2	3	0.6	0.7	2	1.4	**2.0**
Tamarisk	0.6	1.1	0.7	2.2	1.1	2.4	**3.1**
Open Water/gravel, mud **	2.8	3	8.4	3.9	1.5	5.9	**14.3**
Subtotal	56.9		110.7	40.4		40.0	**150.7**
Disturbed/Developed	7.5	0	0	12.9	0	0	**0**
Total	**64.4**		**110.7**	**53.3**		**40.0**	**150.7**

* Compensation ratio identified on page 19 of the Biological Opinion (1-6-95-F-02): "In the extraordinary case of the SMR Flood Control Levee project, the Base has agreed to mitigate the direct loss of habitat value for listed species by enhancing severely degraded riparian habitat at a ratio of 3:1, including revegetation", and in Term and Condition No. 5(d) on Page 36.
**Identified as habitat for least Bell's vireo, southwestern willow flycatcher, or arroyo toad in Appendix 1 of the Biological Opinion (pages 50-53).

Table 4.3.4-9

Fish and Wildlife Habitat Impacts and Compensation Requirements for Direct Impacts Associated with Alternative 2C

Vegetation/Habitat Type	Permanent Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Temporary Impact (Acres)	Compensation Ratio (x:1) *	Required Mitigation (Acres)	Total Mitigation (Acres)
Arundo	3.0	1.1	3.3	5.0	0.55	2.7	**6.0**
Diegan Coastal Sage Scrub	22.6	2	45.2	2.4	1	2.4	**47.6**
Freshwater Marsh **	0.5	3	1.5	0.2	1.5	0.3	**1.8**
Grass-Forb Mixed **	12.1	3	36.3	14.9	0.83	12.4	**48.7**
Mixed Willow Exotic **	11.2	3	33.6	13.3	1.1	14.6	**48.2**
Riparian Scrub **	5.6	3	16.8	1.5	1.5	2.3	**19.1**
Riparian Woodland **	0.2	3	0.6	0.7	2	1.4	**2.0**
Tamarisk	0.6	1.1	0.7	2.2	1.1	2.4	**3.1**
Open Water/gravel, mud **	2.8	3	8.4	4.0	1.5	6.0	**14.4**
Subtotal	58.6		146.4	44.2		44.5	**190.9**
Disturbed/Developed	7.9	0	0	13.1	0	0	**0**
Total	**66.5**		**146.4**	**57.3**		**44.5**	**190.9**

* Compensation ratio identified on page 19 of the Biological Opinion (1-6-95-F-02): "In the extraordinary case of the SMR Flood Control Levee project, the Base has agreed to mitigate the direct loss of habitat value for listed species by enhancing severely degraded riparian habitat at a ratio of 3:1, including revegetation", and in Term and Condition No. 5(d) on Page 36.

**Identified as habitat for least Bell's vireo, southwestern willow flycatcher, or arroyo toad in Appendix 1 of the Biological Opinion (pages 50-53).

2. Sensitive habitats will be properly delineated to determine construction zones and access roads.

3. Construction monitoring shall be conducted by a qualified biologist to insure no inadvertent impacts to sensitive species occur during construction (see below). Post construction monitoring report as required by the USFWS Programmatic Riparian Biological Opinion shall be submitted to Environmental Security, MCB Camp Pendleton.

4. No habitat will be cleared during the breeding season of the least Bell's vireo and southwestern willow flycatcher, which begins March 15 and ends August 31.

The Proposed Action may affect least Bell's vireo, southwestern willow flycatchers and arroyo southwestern toads which use the riparian habitat within the Santa Margarita River. The potential effects to these species and their habitat are limited and would be offset by the mitigation measures developed in accordance with the implementation of the riparian conservation plan. These mitigation measures would include restricting vegetation clearing during the breeding season (March 15 through August 31), and conducting habitat enhancement in a manner similar to that described in the USFWS Programmatic Riparian Biological Opinion. The action proponent shall submit a post-construction report to the AC/S, Environmental Security, MCB Camp Pendleton incorporating the data requirements identified on page 5 of Appendix 5 of the USFWS Programmatic Riparian Biological Opinion.

In addition, the action proponent should retain a qualified biological monitor to ensure that all mitigation measures designed to minimize the potential for take of endangered species including surveying construction areas at night to remove arroyo southwestern toads. The monitoring biologist should survey and map vegetation to be removed in the field using staked limits of disturbance and completed engineering drawings. The results of this pre-construction mapping will provide specific project impact acreage for use in calculating the required amount of restoration compensation to provide to offset impacts to endangered species habitat. At that time, the monitoring biologist will deduct the acreage disturbed during construction of, and provided as mitigation for, the BRAC fueling point project such that appropriate credit for previous mitigation efforts is obtained from the USFWS, and that impact areas are not being mitigated for twice.

Mitigation for loss of occupied coastal sage scrub habitat will include the following measures:

- All clearing and grubbing would be conducted outside of the coastal California gnatcatcher breeding season (February 15 through August 1); and

- Compensation for habitat loss will include revegetating disturbed habitat with coastal sage scrub on a 2:1 ratio for occupied gnatcatcher habitat, and restoring degraded habitat to coastal sage scrub on sites adjacent to existing coastal sage scrub habitat.

Mitigation for loss of jurisdictional wetlands and waters of the United States will include the following measure:

- Compensation for permanent loss of wetlands and waters of the U.S. will be mitigated at a 3:1 ratio, and will include replacement of lost wetland values such that no net loss of wetlands occurs.

Best Management Practices (BMPs) shall be developed and implemented to minimize the potential for water quality degradation through controlling sedimentation during construction and dewatering activities, as well as accidental fuel, oil, and other lubricant spills. In addition, the potential for concreting material to enter the water shall be minimized through development and implementation of appropriate BMPs.

Prior to demolition of the existing Basilone Road Bridge, a qualified biologist should conduct a roosting bat survey under the bridge to ensure that roosting bats are not harmed during demolition. If bats are present, active exclusion efforts should be undertaken, such as the installation of progressive, one-way bat valves. When the roosting bats have relocated, the existing bridge could be demolished.

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4.4 LAND USE

4.4.1 Criteria for Significance Determination

The criteria for significance determination is mandated by the MCB Camp Pendleton and the MCAS Camp Pendleton Master Plans and is dependent upon the land use designations for each location that a project site is planned. It is important that the existing structures and uses would not be affected by the proposed project development, and that existing uses of surrounding areas would not be negatively affected.

For the purposes of this project, determination of significance for land use is based on the following thresholds:

- Inconsistency and/or conflict with the environmental goals, objectives, or guidelines of the MCB Camp Pendleton and the MCAS Camp Pendleton Master Plans or Air Installation Compatibility Use Zones (AICUZ).

- Incompatibility with existing land uses on site; and

- Incompatibility with surrounding land uses.

Land use compatibility in terms of noise is discussed in Section 4.6 and land uses in terms of safety and environmental health (Accident Potential Zones [APZ], Clear Zones, and Explosive Safety Quantity Distance [ESQD] Arcs) are discussed in Section 4.10.

4.4.2 Impact Analysis

4.4.2.1 Alternative 3A [Levee Alignment 3 + Bridge Alignment A]-Preferred Alternative

Levee Alignment 3. The MCB Camp Pendleton Master Plan designates the Santa Margarita River as a maneuver area. Maneuver areas are designated in the Range Training Regulations (Base Order P3500.1J) and are located throughout MCB Camp Pendleton in areas used for field training and combat simulation, and infrastructure supporting the missions of MCB Camp Pendleton and MCAS Camp Pendleton. Maneuvers are prohibited in certain areas due to hazardous operations (i.e. ordinance disposal) or critical environmental factors including impacts to sensitive habitats. The MCB Camp Pendleton Master Plan states that a large amount of sensitive habitat is located on MCB Camp Pendleton. All military actions, including military training exercises, construction projects, or any alteration to the land must not have a negative impact on sensitive species, habitats, or wetlands (U.S. Navy, 1992).

The land use proposed along Levee Alignment 3 would be considered utility infrastructure, located within a maneuver area, that would protect the existing facilities and operations at MCAS Camp Pendleton, the Chappo (22) Area, the Santa Margarita Ranch House complex, and Sewage Treatment Plant (STP) No. 3 from a flood event up to 100 years in magnitude. Levee Alignment 3 would be a flood control improvement designated as Utilities, Standard Land Use Coding Manual (SLUCM) Number 48. Levee Alignment 3 would result in a permanent change to the undeveloped land uses for the construction and operations of the flood control improvement. In addition, spur dikes/silt fences would be located within the Santa Margarita River and would result in a permanent change to the undeveloped land. Levee Alignment 3 is not planned in the MCB Camp Pendleton or MCAS Camp Pendleton Master Plans. The permanent conversion of undeveloped land to utility infrastructure would result in that land being unavailable for future projects. However, because of the large amount of available undeveloped land on MCB Camp Pendleton, this impact would not be significant.

Levee Alignment 3 would be located in areas which are not actively used for field training or simulating combat situations. The levee structure and spur dikes/silt fences would not conflict with MCB Camp Pendleton operations and training or active maneuver areas. The flood control structure would possibly increase flooding at MCB Camp Pendleton facilities within the floodplain limits on the north side of the river, including Wilcox Rifle Range, by altering the river flow during flood events. This would not affect the use of Wilcox Rifle Range during the dry season. However, increased flooding of Wilcox Rifle Range would prevent training during flood conditions and increase the cost to maintain that facility. This would possibly result in the need to relocate the Wilcox Rifle Range. Land uses north of the floodplain limits of the river, including the 25 and 33 Areas, would not be affected by the flood control improvement. Existing water production wells presently located within the floodplain limits would not be affected by the flood control improvement. Therefore, the flood control improvement would be compatible with surrounding land uses, and no significant impacts to land use would occur.

Levee Alignment 3 would require that the existing Basilone Road be raised in height to clear the levee. These alterations would be compatible with existing land uses on the site and would not be considered significant impacts to land use. This land use would be consistent with existing land uses.

Stormwater management system improvements, discussed in the following section, are also proposed for this project. Therefore, this increase would not be significant. However, increased stormwater runoff could require a revision to the NPDES or Section 401 permits.

In relation to the AICUZ land use compatibility guidelines for MCAS Camp Pendleton, Levee Alignment 3 would be located within the Type III Clear Zone at both the north and south ends of the airfield. According to the recommended land use compatibility in the AICUZ guidelines, the placing

of structures, buildings, or above-ground utility lines in the clear zone are subject to severe restrictions. In a majority of the clear zones, these items are prohibited, and specific guidance is provided by NAVFAC P-80.3, which states that the structure must not penetrate the airfield approach/departure imaginary surface. The height of the levee would not penetrate the approach/departure imaginary surface. Therefore, significant land use impacts would not occur as a result of levee construction in the clear zone.

Borrow Sites. The use of the borrow sites would disturb 17 acres at the Chappo (22) Area borrow site. The proposed borrow site is located in an undeveloped maneuver area. However, this area is not actively used for training or combat simulations and no significant impacts to land use would occur.

Stormwater Management System. The pump station would be constructed and operated to discharge stormwater runoff. There would be no alteration in these natural drainage areas. The pump station would be constructed adjacent to STP No. 3. This facility would not conflict with existing or surrounding land uses, and no significant impacts are anticipated.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. Bridge Alignment A would be the Basilone Road Bridge Replacement along the existing road alignment. Bridge Alignment A would be consistent with the MCB Camp Pendleton Master Plan and MCAS Camp Pendleton Master Plan for use as a roadway and transportation crossing of the Santa Margarita River. The replacement of Basilone Road Bridge along the existing alignment would not be a change in the designated land use.

In relation to the AICUZ land use compatibility, Bridge Alignment A would be located approximately 1,400 feet from the approach end of Runway 21 within the clear zone. According to NAVFAC P-80.3, roads are permitted if they do not penetrate the airfield approach/departure imaginary surface, which must allow for vehicles using the road. The Basilone Bridge would be located under the approach/departure clearance imaginary surface which has a 40:1 slope. Thus, with a runway elevation of 77 feet above mean sea level (MSL) and a 15-foot vehicle clearance (NAVFAC P-80.3, Table B), the elevation of the proposed bridge is 104 feet above MSL. Bridge Alignment A would be 104 feet above MSL. A standard traffic light, which would be controlled by the airfield control tower, and would stop traffic during aircraft approach and departure times. Therefore, Bridge Alignment A would not result in significant impacts to land use compatibility with the MCB Camp Pendleton Master Plan, MCAS Camp Pendleton Mater Plan, or MCAS AICUZ.

4.4.2.2 Alternative 3B [Levee Alignment 3 + Bridge Alignment B]

Levee Alignment 3. Alternative 3B would include the same levee alignment discussed in Alternative 3A. Levee Alignment 3 would be compatible with the land uses designated in the MCB Camp Pendleton Master Plan, the MCAS Camp Pendleton Master Plan, and the AICUZ.

Borrow Sites. Alternative 3B would include the same borrow sites as Alternative 3A. No significant land use impacts are anticipated.

Stormwater Management System. Alternative 3B would include the same stormwater management system as Alternative 3A. No significant land use impacts are anticipated.

Bridge Alignment B - East Curve Alignment. The replacement of the Basilone Road Bridge with a bridge which crosses the Santa Margarita River with an eastern curve would result in a minimal alteration to the existing land use as a transportation route. The East Curve Alignment would have similar roadway approaches and would be in substantial conformance with the existing alignment. This alignment would be consistent with the existing land use of the Basilone Road Bridge as a transportation route. Therefore, no significant impacts to land use would occur.

4.4.2.3 Alternative 3C [Levee Alignment 3 + Bridge Alignment C]

Levee Alignment 3. Alternative 3C would include the same levee alignment discussed in Alternative 3A. Levee Alignment 3 would be compatible with the land uses designated in the MCB Camp Pendleton Master Plan and the MCAS Camp Pendleton Master Plan and with the AICUZ.

Borrow Sites. Alternative 3C includes the same borrow sites as Alternative 3A. No significant land use impacts are anticipated.

Stormwater Management System. Alternative 3C would include the same stormwater management system as Alternative 3A. No significant land use impacts are anticipated.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Bridge Alignment C would be located within an area designated as a Maneuver Area. The MCB Camp Pendleton Master Plan does not designate this alignment as a transportation corridor. However, if the existing Basilone Road Bridge is eliminated and replaced with the Rattlesnake Canyon alignment, there would be no significant impacts to the land use or circulation elements.

This alignment would result in a permanent change to the undeveloped land along the construction corridor of the Rattlesnake Canyon Road Alignment within the Santa Margarita River to a

transportation route. Although this area is a maneuver area, no intensive military activities occur which would be affected by this road. The tactical vehicle maintenance facility and other related structures in the Vado Del Rio (25) Area would be relocated or demolished for the construction of the road alignment to connect with Basilone Road, resulting in a potentially significant impact.

4.4.2.4 Alternative 1A [Levee Alignment 1 + Bridge Alignment A]

Levee Alignment 1. Levee Alignment 1 is not planned in the MCB Camp Pendleton or MCAS Camp Pendleton Master Plans. Levee Alignment 1 would be considered utility infrastructure located within a Maneuver Area. This would be a permanent change to the undeveloped land uses for the construction and operations of the flood control improvement. In addition, spur dikes/silt fences would be located within the Santa Margarita River and would result in a permanent change to the undeveloped land. The permanent conversion of undeveloped land to utility infrastructure would result in that land being unavailable for future projects. However, because of the large amount of available undeveloped land on MCB Camp Pendleton, this impact would not be significant.

Levee Alignment 1 would be located in areas which are not actively used for field training or simulating combat situations. The levee structure and spur dikes/silt fences would not conflict with MCB Camp Pendleton operations and training or active maneuver areas. The flood control improvement may contribute to increased flooding to MCB Camp Pendleton facilities and operations within the floodplain limits on the north side of the river, including the Wilcox Rifle Range, by altering the river flow during flood events. This would not affect the use of the Wilcox Rifle Range during the dry season. However, increased flooding of Wilcox Rifle Range would prevent training during flood conditions and increase the cost to maintain that facility, and could result in a requirement to relocate the Wilcox Rifle Range. Land uses north of the river, including the 25 and 33 Areas would not be affected by the flood control improvement. Existing water production wells are presently located within the floodplain limits and would not be affected by the flood control improvement. Therefore, the flood control improvement would be compatible with surrounding land uses and no significant impacts to land use would occur.

Borrow Sites. For Alternative 1A, both the borrow site at Chappo (22) Area as well as the East Oscar borrow site would be used. No significant impacts are anticipated.

Stormwater Management System. The stormwater management system would be the same as that described for Levee Alignment 3, with the addition of a detainage basin west of the MCAS Camp Pendleton airfield. This detainage basin would be in the Clear Zone and APZ I, but would not be permanently wet, intersect any imaginary surfaces, or increase human occupancy of the area. Therefore, no significant impacts are anticipated.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. Bridge Alignment A is the Basilone Road Bridge Replacement along the existing road alignment. As discussed under Alternative 3A, the replacement of the Basilone Road Bridge along the existing alignment would not be a change in the designated land use. As discussed under Alternative 3A, the bridge replacement would result in vehicles intersecting the approach-departure clearance imaginary surface for the airfield and would represent an incompatible land use. A standard traffic light which would be controlled by the aircraft control tower would stop traffic during approach and departure times. Therefore, bridge Alignment A would not result in significant impacts to land use compatibility.

4.4.2.5 Alternative 1B [Levee Alignment 1 + Bridge Alignment B]

Levee Alignment 1. Alternative 1B includes the same Levee Alignment 1 discussed in Alternative 1A. Levee Alignment 1 would be compatible with the land uses designated in the MCB Camp Pendleton Master Plan and the MCAS Camp Pendleton Master Plan. Levee Alignment 1 would not be compatible with the AICUZ which states that utilities within a clear zone as not a recommended compatible land use.

Borrow Sites. Alternative 1B includes the same borrow sites as Alternative 3A. No significant impacts are anticipated.

Stormwater Management System. Alternative 1B includes the same stormwater management system as Alternative 1A. No significant impacts are anticipated.

Bridge Alignment B - East Curve Alignment. The replacement of the Basilone Road Bridge with a bridge which crosses the Santa Margarita River with an eastern curve would result in a minimal alteration to the existing land use as a transportation route. The East Curve Alignment would have similar roadway approaches and would be in substantial conformance with the Existing Alignment. This alignment would be consistent with the existing land use of the Basilone Road Bridge as a transportation route. Therefore, no significant impacts to land use would occur.

4.4.2.6 Alternative 1C [Levee Alignment 1 + Bridge Alignment C]

Levee Alignment 1. Alternative 1C would include the same Levee Alignment 1 discussed in Alternative 1A. Levee Alignment 1 would be compatible with the land uses designated in the MCB Camp Pendleton Master Plan and the MCAS Camp Pendleton Master Plan and with the AICUZ.

Borrow Sites. Alternative 1C would include the same borrow site at Chappo (22) Area as Alternative 3A. No significant impacts are anticipated.

Stormwater Management System. Alternative 1C would include the same stormwater management system as Alternative 1A. No significant impacts are anticipated.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Bridge Alignment C - Rattlesnake Canyon Road Alignment would be located within an area designated as a Maneuver Area. The MCB Camp Pendleton Master Plan does not designate this alignment as a transportation corridor. However, if the existing Basilone Road Bridge is eliminated and replaced with the Rattlesnake Canyon alignment, there would be no significant impacts to the land use or circulation elements.

This alignment would result in a permanent change to the undeveloped land along the construction corridor of the Rattlesnake Canyon Road Alignment within the Santa Margarita River to a transportation route. Although this area is designated as a Maneuver Area, these are no intensive military activities which would be affected by this road. The tactical vehicle maintenance facility and other related structures in the Vado Del Rio (25) Area would be relocated or demolished for the construction of the road alignment to connect with Basilone Road, resulting in a potentially significant impact.

4.4.2.7 Alternative 2A [Levee Alignment 2 + Bridge Alignment A]

***Levee Alignment** 2*. Levee Alignment 2 would be considered utility infrastructure, located within a Maneuver Area. This alignment would require fewer related spur dikes/silt fences located within designated maneuver areas than Levee Alignments 3 and 1. Levee Alignment 2 would also involve hillside grading which would result in a permanent change to the undeveloped land. The permanent conversion of this land would result in the land being unavailable for future projects. However, because of the large amount of undeveloped land available on MCB Camp Pendleton, impacts would not be significant.

Levee Alignment 2 would be located in areas which are not actively used for field training or simulating combat situations. The levee structure, spur dikes/silt fences, and hillside shaving would not conflict with MCB Camp Pendleton operations and training or active maneuver areas. The flood control improvement would be compatible with the surrounding land uses. The flood control improvement may contribute to increased flooding to MCB Camp Pendleton facilities and operations within the floodplain limits on the north side of the river, including Wilcox Rifle Range, by altering the river flow during flood events. This would not affect the use of Wilcox Rifle Range during the dry season. However, increased flooding of Wilcox Rifle Range will prevent training during flood conditions and increase the cost to maintain that facility, and could result in a requirement to relocate Wilcox Rifle Range (Collier, 1997). Land uses north of the river, including the Vado Del Rio (25) Area and the Margarita (33) Area would not be affected by the flood control improvement. Existing water production wells are presently located within the floodplain limits and would not be affected by the flood control improvement. Therefore, the flood control improvement would be compatible with surrounding land uses and no significant impacts to land use would occur.

Borrow Sites. Alternative 2A would include the same borrow site as Alternative 3A. No significant impacts are anticipated.

Stormwater Management System. The stormwater management system would be the same as for Levee Alignment 1. As discussed in Alternative 1A, no significant impacts are anticipated.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. Bridge Alignment A is the Basilone Road Bridge Replacement along the existing road alignment. As discussed under Alternative 3A, the replacement of the Basilone Road Bridge along the existing alignment would not be a change in the designated land use. As discussed under Alternative 3A, the bridge replacement would result in vehicles intersecting the approach-departure clearance surface for the airfield and would represent an incompatible land use. A standard traffic light which would be controlled by the aircraft control tower would stop traffic during approach and departure times. Therefore, bridge Alignment A would not result in significant impacts to land use compatibility.

4.4.2.8 Alternative 2B [Levee Alignment 2 + Bridge Alignment B]

***Levee Alignment** 2.* Alternative 2B includes the same Levee Alignment 2 discussed in Alternative 2A. Levee Alignment 2 would be compatible with the land uses designated in the MCB Camp Pendleton Master Plan and the MCAS Camp Pendleton Master Plan. Levee

Alignment 2 would not be compatible with the AICUZ which cites utilities within a clear zone as not a recommended compatible land use.

Stormwater Management System. Alternative 2B would include the same stormwater management system as Alternative 2A. No significant impacts are anticipated.

Bridge Alignment B - East Curve Alignment. The replacement of the Basilone Road Bridge with a bridge which crosses the Santa Margarita River with an eastern curve would result in a minimal alteration to the existing land use as a transportation route. The East Curve Alignment would have similar roadway approaches and would be in substantial conformance with the Existing Alignment. This alignment would be consistent with the existing land use of the Basilone Road Bridge as a transportation route. Therefore, no significant impacts to land use would occur.

4.4.2.9 Alternative 2C [Levee Alignment 2 + Bridge Alignment C]

Levee Alignment 2. Alternative 2C includes the same Levee Alignment 2 discussed in Alternative 2A. Levee Alignment 2 would be compatible with the land uses designated in the MCB Camp Pendleton Master Plan and the MCAS Camp Pendleton Master Plan. Levee Alignment 2 would not be compatible with the AICUZ which cites utilities within a clear zone as not a recommended compatible land use.

Borrow Sites. Alternative 2C would include the same borrow sites as Alternative 3A. No significant impacts are anticipated.

Stormwater Management System. Alternative 2C would include the same stormwater management system as Alternative 2A. No significant impacts are anticipated.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Bridge Alignment C - Rattlesnake Canyon Road Alignment would be located within an area designated as a Maneuver Area (Ground Training Master Plan). The MCB Camp Pendleton Master Plan does not designate this alignment as a transportation corridor. However, if the existing Basilone Road Bridge is eliminated and replaced with the Rattlesnake Canyon alignment, there would be no significant impacts to the land use or circulation elements.

This alignment would result in a permanent change to the undeveloped riparian habitat along the construction corridor of the Rattlesnake Canyon Road Alignment within the Santa Margarita River to a transportation route. Although this area is a maneuver area, these are no intensive military activities which would be affected by this road. The tactical vehicle maintenance facility and other

related structures in the Vado Del Rio (25) Area would be relocated or demolished for the construction of the road alignment to connect with Basilone Road.

4.4.2.10 No Action Alternative

With the No Action Alternative, flood control protection would not be provided to MCB Camp Pendleton and MCAS Camp Pendleton facilities. The existing temporary levee would be left in place, and severe flood events may impact surrounding land uses subject to inundation. The stormwater management system would not be implemented without a levee structure. With the No Action Alternative, the Basilone Road Bridge Replacement would not be implemented. The existing road bridge was constructed to provide a useful life span of five years and withstand a 25-year flood event. The existing road bridge cannot accommodate heavy trucks or equipment. The removal of the existing road bridge would eliminate Basilone Road as a major north-south circulation route and transportation crossing of the Santa Margarita River. This would contribute to increased traffic at other bridge crossings of the river at Interstate 5 and Stuart Mesa Road in the event that the existing road bridge is damaged.

4.4.3 Mitigation Measures

A potentially significant land use impact is associated with Bridge Alignment A - Existing Basilone Bridge Alignment. The proposed bridge alignment's vehicle clearance would intersect the airfield approach/departure imaginary surface, which is incompatible with the requirements in NAVFAC P-80.3. However, installation of the traffic control device controlled from the airfield control tower would avoid this impact.

Increased stormwater flow in the Santa Margarita River Channel could constitute a change in the NPDES/Section 401 general permit. Consultation with ACOE to determine revisions or amendments to these permits shall occur prior to the beginning of construction.

4.4.4 Analysis of Significance

Implementation of the Flood Control Project (P-010) and/or Basilone Road Bridge Replacement (P-030) would not result in significant impacts to land use after mitigation measures are implemented.

4.5 TRAFFIC

4.5.1 Criteria for Significance Determination

Criteria for significance for traffic impacts were assessed based on changes in the level of service (LOS) for each of the key road segments in the project area. Traffic impacts were considered significant if the project could cause roadway performance to drop below LOS E. Level of Service E is defined as roadway conditions where peak-hour traffic would exceed the maximum design capacity of the roadway, and would result in very unstable conditions or even the forced breakdown in traffic flows.

4.5.2 Impact Analysis

The traffic analysis used a standard technique of trip generation, trip distribution, and traffic assignment. Trip generation was based on best engineering estimates and construction planning concepts to determine the types and amounts of construction materials and equipment, and phasing of construction activities. Vehicle trip generation for each alternative project component was analyzed and quantified. Based on the projected construction schedule, the variation in vehicle trips generated by onsite activities was determined for the average weekday and the morning and afternoon peak hours on the key roadway segments.

The distribution of trips was based on the location of the various project components in relationship to the sources of construction materials, the phasing of construction activities over the 2-year construction period, and the travel patterns for construction equipment and workers. The resulting vehicle trips generated by the project during the peak hours were then added to the non-project traffic (background traffic) projected for the key road segments under baseline conditions. Future traffic in the general project area was projected using an annual average growth rate of 1.6 percent during the period of analysis, and applied to all of the existing traffic movements and volumes of key roads. Intersections on key road segments that would experience heavy traffic volumes were examined for possible deficiencies; however, an intersection level of service analysis was not performed. The following sections are a discussion of the traffic impacts for each project component.

4.5.2.1 Alternative 3A [Levee Alignment 3 + Bridge Alignment A] - Preferred Alternative

The key roads would not experience significant changes in LOS as a result of construction traffic generated by Alternative 3A. The projected peak hour traffic and the associated LOS is shown in Table 4.5-1.

Table 4.5-1

Average Peak-Hour Traffic Volumes on Key Roads for Alternative 3A

		1998				1999			
		Traffic		LOS		Traffic		LOS	
	Capacity	AM	PM	AM	PM	AM	PM	AM	PM
Vandegrift Blvd, Oceanside Gate to Stuart Mesa/Ash Road	5,400	2,339	1,878	B	B	2,415	1,891	B	B
Vandegrift Blvd, Stuart Mesa/Ash Road to 9th Street	3,600	2,317	1,788	D	C	2,392	1,799	D	C
Vandegrift Blvd, 9th Street to Basilone Road	3,200	1,549	1,435	B	B	1,598	1,434	B	B
Vandegrift Blvd, Rattlesnake Canyon Rd to Basilone Rd	3,200	1,737	1,861	C	C	1,798	1,914	C	C
Basilone Rd, Vandegrift Blvd to Vado Del Rio Rd.	2,000	210	204	A	A	204	144	A	A
Rattlesnake Canyon Rd	2,200	1,726	1,558	E	E	1,787	1,601	E	E
Stagecoach Rd	2,000	339	339	B	B	351	350	B	B
Vado Del Rio Rd	2,000	235	157	A	A	244	162	B	A

Levee Alignment 3. Traffic for Levee Alignment 3 would be generated primarily by the movement of construction materials to and from the project construction sites and the borrow site and batch plant in Chappo (22) Area (see Figure 2.3-1). This includes about 10,000 round trips via Basilone Road and Vandegrift Boulevard to Chappo (22) Area during the first year of construction (1998). In addition, approximately 21,000 round trips would be made to the borrow site/batch plant via Rifle Range Road and a temporary construction route through Chappo (22) Area crossing Vandegrift Boulevard. The floodwall portion of Levee Alignment 3 would generate about 600 of these trips. These truck trips would involve hauling soil materials from excavation and demolition activities at the construction sites to the borrow site/batch plant where soil cement materials would be "batched" for return to the construction sites along the same routes.

Other trips for construction of the levee would include about 7,300 trips for delivery and on-site movement of rock for windrow revetment scour protection, and about 500 trips for concrete and steel for the floodwall and stormwater pump station over the two-year construction period. These trips would be primarily via Vandegrift Boulevard from the main Oceanside gate and Basilone Road to the construction sites. Concrete materials would be delivered to the batch plant in Chappo (22) Area via Vandegrift Boulevard for batch processing of concrete for delivery to the construction sites.

Stormwater Management System. The pump station would be constructed at about the same time as the west end of the flood control structure (1999). Trips generated by construction of the system have been accounted for in the levee construction activities because of the integration of the system

into the levee structure itself. There would be no significant increase in traffic volumes beyond those described under either of the proposed levee alignments. Therefore, there would be no significant traffic impact from the construction of the pump station.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. The proposed bridge replacement in the existing alignment of Basilone Road would be constructed at the same time as the east end of the levee because the bridge must span the completed levee (1998). As a result, fill material from demolition of the existing levee and excavation of the toe trench of the new levee would provide the majority of bridge approach material at the construction site. Additional fill material would generate about 3,200 trips from the borrow site located east of the project area in Chappo (22) Area. The material would be brought to the site via Vandegrift Boulevard and Basilone Road. Other onbase trip generators for bridge construction would include concrete deliveries from the batch plant in Area 22 via Vandegrift Boulevard and Basilone Road (500 trips). Trips originating offbase include supplies of sand, gravel, and cement for concrete (40 trips); rocks for slope protection on bridge roadway approaches (900 trips); prefabricated pilings and prestressed steel for the bridge structure itself (60 trips); and aggregate and paving materials for the roadway (180 trips). All trips originating offbase would occur on Vandegrift Boulevard from the Oceanside Gate to the construction site on Basilone Road. All trips originating on and offbase would generate approximately 4,880 total truck trips, excluding the shared trips for borrow materials.

During the construction period of Bridge Alignment A, some traffic on Basilone Road would be diverted to the bridge crossing near the intersection of Vandegrift Boulevard and Stuart Mesa Road located about 7 miles to the southwest towards the Oceanside Gate. Rifle Range Road would be used as a temporary access for the area. There would be significant, temporary impacts to Stuart Mesa and Rifle Range roads. Military Police would be utilized for traffic control.

4.5.2.2 Alternative 3B [Levee Alignment 3 + Bridge Alignment B]

Alternative 3B would not increase total trips appreciably over Alternative 3A, even though there would be additional construction material requirements for Bridge Alignment B. Traffic impacts are shown in Table 4.5-2. There would be no significant changes in LOS from construction traffic generated by Alternative 3B.

Levee Alignment 3. The traffic impacts for Levee Alignment 3 would be the same as Alternative 3A.

Stormwater Management System. The traffic impacts of the Stormwater Management System would be the same as Alternative 3A.

Table 4.5-2

Average Peak-Hour Traffic Volumes on Key Roads for Alternative 3B

		1998				1999			
		Traffic		LOS		Traffic		LOS	
	Capacity	AM	PM	AM	PM	AM	PM	AM	PM
Vandegrift Blvd, Oceanside Gate to Stuart Mesa/Ash Road	5,400	2,339	1,878	B	B	2,415	1,891	B	B
Vandegrift Blvd, Stuart Mesa/Ash Road to 9th Street	3,600	2,317	1,788	D	C	2,392	1,799	D	C
Vandegrift Blvd, 9th Street to Basilone Road	3,200	1,549	1,435	B	B	1,598	1,434	B	B
Vandegrift Blvd, Rattlesnake Canyon Rd to Basilone Rd	3,200	1,737	1,861	C	C	1,798	1,914	C	C
Basilone Rd, Vandegrift Blvd to Vado Del Rio Rd.	2,000	210	204	A	A	204	144	A	A
Rattlesnake Canyon Rd	2,200	1,726	1,558	E	E	1,787	1,601	E	E
Stagecoach Rd	2,000	339	339	B	B	351	350	B	B
Vado Del Rio Rd	2,000	235	157	A	A	244	162	B	A

Bridge Alignment B - East Curve Alignment. The traffic effects from construction of the East Curve Alignment would be almost identical to the existing alignment alternative because of similarities in construction requirements and only minor variations due to bridge layout. Therefore, this alternative, in similar fashion to Bridge Alignment A would not result in any significant changes in LOS due to project-related traffic impacts.

4.5.2.3 Alternative 3C [Levee Alignment 3 + Bridge Alignment C]

Alternative 3C would generate higher traffic counts due to a much longer bridge alignment. Construction of this bridge alternative would increase total trips by almost 10 percent over Alternatives 3A and 3B. This would reduce LOS primarily along Vandegrift Boulevard and Rattlesnake Canyon Road. However, the reduction in LOS would not drop below LOS E, and would therefore not be considered significant. Table 4.5-3 summarizes the overall traffic impacts.

Levee Alignment 3. The traffic impacts of the levee in Alternative 3C would be the same as Alternative 3A.

Stormwater Management System. The same Stormwater Management System would be constructed for Alternative 3C as for Alternative 3A. Therefore, traffic impacts would be the same as in Alternative 3A.

Table 4.5-3

Average Peak-Hour Traffic Volumes on Key Roads for Alternative 3C

		1998				1999			
		Traffic		LOS		Traffic		LOS	
	Capacity	AM	PM	AM	PM	AM	PM	AM	PM
Vandegrift Blvd, Oceanside Gate to Stuart Mesa/Ash Road	5,400	2,343	1,884	B	B	2,415	1,939	B	B
Vandegrift Blvd, Stuart Mesa/Ash Road to 9th Street	3,600	2,321	1,794	D	C	2,392	1,847	D	C
Vandegrift Blvd, 9th Street to Basilone Road	3,200	1,553	1,441	B	B	1,598	1,482	B	B
Vandegrift Blvd, Rattlesnake Canyon Rd to Basilone Rd	3,200	1,746	1,870	C	C	1,798	1,926	C	C
Basilone Rd, Vandegrift Blvd to Vado Del Rio Rd.	2,000	205	205	A	A	205	205	A	A
Rattlesnake Canyon Rd	2,200	1,726	1,558	E	E	1,787	1,613	E	E
Stagecoach Rd	2,000	339	339	B	B	351	351	B	B
Vado Del Rio Rd	2,000	235	157	A	A	244	162	B	A

Bridge Alignment C - Rattlesnake Canyon Road Alignment. The Rattlesnake Canyon Road Alignment would also be similar to the other proposed bridge alignments in terms of the basic trip generators. However, the proposed length of this bridge would increase the amount of required materials and the corresponding trip generation. The number of trips for roadway approach fill material would increase by about 50 percent for a total of 4,760 trips. Likewise, the additional piles, steel, and concrete would increase by the same percentage for a total 960 trips. Aggregate and paving material would, however, increase trips substantially (2,250) because of the additional road and bridge surfaces. The assignment of trips to key roadway would be slightly different with more trips occurring on Vandegrift between Basilone and Rattlesnake Canyon roads.

Therefore, the corresponding changes in projected peak-hour traffic and the associated changes in LOS would not be substantially different from the other bridge replacement alternatives. Table 4.5-3 shows the Rattlesnake Canyon Road traffic effects. None of the key roads would experience a significant change in LOS due to project traffic effects.

This alternative would create a new intersection at Vandegrift Boulevard southwest of the existing intersection of Rattlesnake Canyon Road and Vandegrift Boulevard. Potential impacts at this new intersection include operational and safety issues. Operational issues would include turning movements northbound from Vandegrift Boulevard to the new bridge. In addition, right-hand turn movements from southbound Vandegrift Boulevard to the new roadway could cause potential traffic

impact. These potential impacts can be mitigated during final design with the incorporation of turning pockets and signalization.

4.5.2.4 Alternative 1A [Levee Alignment 1 + Bridge Alignment A]

All of the alternatives based on Levee Alignment 1, including Alternative 1A, would generate higher traffic impacts. This is due to a levee structure that generally would be wide and higher, require greater rock slope protection against scour effects, and involve hillside shaving on the north bank of the river. This would increase the overall number of construction related trips. However, Alternative 1A would not result in significant traffic impacts on the key roads. Table 4.5-4 indicated that LOS on key roads would not drop below LOS E during construction.

Table 4.5-4

Average Peak-Hour Traffic Volumes on Key Roads for Alternative 1A

		1998				1999			
		Traffic		LOS		Traffic		LOS	
	Capacity	AM	PM	AM	PM	AM	PM	AM	PM
Vandegrift Blvd, Oceanside Gate to Stuart Mesa/Ash Road	5,400	2,343	1,884	B	B	2,419	1,943	B	B
Vandegrift Blvd, Stuart Mesa/Ash Road to 9th Street	3,600	2,321	1,794	C	B	2,396	1,851	C	C
Vandegrift Blvd, 9th Street to Basilone Road	3,200	1,553	1,441	B	B	1,602	1,486	B	B
Vandegrift Blvd, Rattlesnake Canyon Rd to Basilone Rd	3,200	1,738	1,862	C	C	1,799	1,927	C	C
Basilone Rd, Vandegrift Blvd to Vado Del Rio Rd.	2,000	216	216	A	A	194	194	A	A
Rattlesnake Canyon Rd	2,200	1,727	1,559	E	E	1,788	1,614	E	E
Stagecoach Rd	2,000	339	339	B	B	351	351	B	B
Vado Del Rio Rd	2,000	235	157	A	A	244	162	B	A

Levee Alignment 1. The major traffic generators for construction of Levee Alignment 1A would be the movement of fill material from the onbase borrow sites to the construction site. This includes 21,000 trips from the borrow site located east of the project area (East Oscar 2), and 2,100 trips from the borrow site located east in the Chappo (22) Area. However, the largest of these borrow sites (East Oscar 2) would not generate any trips on key roads, and would instead use of Wilcox Range Road and Rifle Range Road to transport the fill material. Other trip generators would include medium haul

truck trips of rock for slope protection originating offbase in Oceanside, truck trips originating onbase from a batch plant in Chappo (22) Area for soil cement materials, and delivery of aggregate and paving material from offbase sources. In addition, 14,000 round-trips would be required for disposal of soil generated from hillside grading. The resulting traffic effects would occur primarily on Vandegrift Boulevard and Basilone Road.

Stormwater Management System. Construction of the Stormwater Management System would not vary substantially from the alternatives based on Levee Alignment 3. Therefore, traffic generated by the stormwater management system under Alternative 1A would not be different from Alternative 3A.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. Bridge Alignment 1B would generate the same traffic impacts under Alternative 3B.

4.5.2.5 Alternative 1B [Levee Alignment 1 + Bridge Alignment B]

Alternative 1B would generate a substantial number of construction related trips. This is due to a much larger levee that would require a greater amount of fill material, the off-haul of excess material from the hillside grading that is part of the levee construction, and a slightly longer bridge. However, even with higher overall traffic effects, Alternative 1B would not result in a significant reduction in LOS on the key roads. Table 4.5-5 shows the peak hour traffic and the associated LOS on key roads.

Table 4.5-5

Average Peak-Hour Traffic Volumes on Key Roads for Alternative 1B

		1998				1999			
		Traffic		LOS		Traffic		LOS	
	Capacity	AM	PM	AM	PM	AM	PM	AM	PM
Vandegrift Blvd, Oceanside Gate to Stuart Mesa/Ash Road	5,400	2,343	1,884	B	B	2,419	1,943	B	B
Vandegrift Blvd, Stuart Mesa/Ash Road to 9th Street	3,600	2,321	1,794	C	B	2,396	1,851	C	C
Vandegrift Blvd, 9th Street to Basilone Road	3,200	1,553	1,441	B	B	1,602	1,486	B	B
Vandegrift Blvd, Rattlesnake Canyon Rd to Basilone Rd	3,200	1,738	1,862	C	C	1,799	1,927	C	C
Basilone Rd, Vandegrift Blvd to Vado Del Rio Rd.	2,000	216	216	A	A	194	194	A	A
Rattlesnake Canyon Rd	2,200	1,727	1,559	E	E	1,788	1,614	E	E
Stagecoach Rd	2,000	339	339	B	B	351	351	B	B
Vado Del Rio Rd	2,000	235	157	A	A	244	162	B	A

Levee Alignment 1. The traffic impacts of Levee Alignment 1B would be the same as Levee Alignment 1A.

Stormwater Management System. Although the operational aspects for the Stormwater Management System under Alternative 1B are different than those required for Alternative 3B, the construction traffic impacts would not vary that greatly. The traffic impacts described in Alternative 3B would be similar to the stormwater management system in Alternative 1B. The addition of a second detainage basin would not affect traffic.

Bridge Alignment B - East Curve Alignment. The traffic impacts for Bridge Alignment B would be the same as Alternative 3B.

4.5.2.6 Alternative 1C [Levee Alignment 1 + Bridge Alignment C]

Alternative 1C would generate the most construction traffic of all the alternatives. This is primarily the result of the additional construction requirements of Bridge Alignment C in addition to the larger levee. However, even with the additional traffic generated by this alternative, LOS on key roads would not be reduced to significant levels. Table 4.5-6 shows the peak hour traffic and the associated LOS on key roads.

Levee Alignment 2. The traffic impacts of the levee would be the same for both Alternatives 1A and 1B.

Table 4.5-6

Average Peak-Hour Traffic Volumes on Key Roads for Alternative 1C

		1998				1999			
		Traffic		LOS		Traffic		LOS	
	Capacity	AM	PM	AM	PM	AM	PM	AM	PM
Vandegrift Blvd, Oceanside Gate to Stuart Mesa/Ash Road	5,400	2,347	1,888	B	B	2,419	1,943	B	B
Vandegrift Blvd, Stuart Mesa/Ash Road to 9th Street	3,600	2,325	1,798	D	C	2,396	1,851	D	C
Vandegrift Blvd, 9th Street to Basilone Road	3,200	1,557	1,445	B	B	1,602	1,486	B	B
Vandegrift Blvd, Rattlesnake Canyon Rd to Basilone Rd	3,200	1,747	1,871	C	C	1,799	1,927	C	C
Basilone Rd, Vandegrift Blvd to Vado Del Rio Rd.	2,000	211	211	A	A	194	194	A	A
Rattlesnake Canyon Rd	2,200	1,727	1,559	E	E	1,788	1,614	E	E
Stagecoach Rd	2,000	339	339	B	B	351	351	B	B
Vado Del Rio Rd	2,000	235	157	A	A	244	162	B	A

Stormwater Management System. The Stormwater Management System would generate the same traffic impacts as Alternatives 1A.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Traffic impacts would be similar to those described under Alternative 3C, the Rattlesnake Canyon Road Alignment, which would generate a substantially higher number of trips due to the construction of a longer bridge. This alignment would involve more grading and excavation that would generate more short haul trips. In addition, the longer bridge would require the delivery of more materials during construction.

4.5.2.7 Alternative 2A [Levee Alignment 2 + Bridge Alignment A]

Alternatives 2A would generate traffic impacts similar to those described for the Alternative 3A series of alternatives because the levee construction requirement would be similar. The variations due to river training structures (i.e., spur and dikes/silt fences versus guide vane) would not result in a substantial difference in the number of construction trips generated. Alternative 2A would not have significant traffic impacts. The peak hour traffic volumes and the associated LOS is s shown in Table 4.5-7.

Levee Alignment 2. The traffic generators are about the same as for Levee Alignment 1A. However, Levee Alignment 2 is about 1,200 feet shorter and does not require any hillside grading. These variations would result in 14,000 fewer trips for off-haul of the hillside grading spoil. While Levee Alignment 2 would require less fill material, the design involves mechanical reinforcing with additional rock slope protection and concrete, resulting in additional haul trips that offset the corresponding reduction in trips for fill material.

Stormwater Management System. The Stormwater Management System for Alternative 2A would generate the same traffic impacts as Alternative 3A.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. Traffic impacts generated by Bridge Alignment A would be the same as Alternative 3A.

Table 4.5-7

Average Peak-Hour Traffic Volumes on Key Roads for Alternative 2A

		1998				1999			
		Traffic		LOS		Traffic		LOS	
	Capacity	AM	PM	AM	PM	AM	PM	AM	PM
Vandegrift Blvd, Oceanside Gate to Stuart Mesa/Ash Road	5,400	2,343	1,884	B	B	2,419	1,943	B	B
Vandegrift Blvd, Stuart Mesa/Ash Road to 9th Street	3,600	2,321	1,794	C	B	2,396	1,851	C	C
Vandegrift Blvd, the Street to Basilone Road	3,200	1,553	1,441	B	B	1,602	1,486	B	B
Vandegrift Blvd, Rattlesnake Canyon Rd to Basilone Rd	3,200	1,738	1,862	C	C	1,799	1,927	C	C
Basilone Rd, Vandegrift Blvd to Vado Del Rio Rd.	2,000	216	216	A	A	210	210	A	A
Rattlesnake Canyon Rd	2,200	1,727	1,559	E	E	1,788	1,614	E	E
Stagecoach Rd	2,000	339	339	B	B	351	351	B	B
Vado Del Rio Rd	2,000	235	157	A	A	244	162	B	A

4.5.2.8 Alternative 2B [Levee Alignment 2 + Bridge Alignment B]

The overall traffic impacts of Alternative 2B would be about the same as Alternative 3B. There would be no significant changes in LOS on key roads due construction activities. Table 4.5-8 shows these impacts.

Levee Alignment 3. Levee Alignment 2 would generate the same traffic impacts as described for Alternative 2A.

Stormwater Management System. The Stormwater Management System would generate the same construction traffic impacts as Alternative 3B.

Table 4.5-8

Average Peak-Hour Traffic Volumes on Key Roads for Alternative 2B

		1998				1999			
		Traffic		LOS		Traffic		LOS	
	Capacity	AM	PM	AM	PM	AM	PM	AM	PM
Vandegrift Blvd, Oceanside Gate to Stuart Mesa/Ash Road	5,400	2,343	1,882	B	B	2,419	1,895	B	B
Vandegrift Blvd, Stuart Mesa/Ash Road to 9th Street	3,600	2,321	1,792	C	B	2,396	1,803	C	B
Vandegrift Blvd, 9th Street to Basilone Road	3,200	1,553	1,439	B	B	1,602	1,438	B	B
Vandegrift Blvd, Rattlesnake Canyon Rd to Basilone Rd	3,200	1,738	1,862	C	C	1,799	1,915	C	C
Basilone Rd, Vandegrift Blvd to Vado Del Rio Rd.	2,000	216	216	A	A	210	210	A	A
Rattlesnake Canyon Rd	2,200	1,727	1,559	E	E	1,788	1,602	E	E
Stagecoach Rd	2,000	339	339	B	B	351	350	B	B
Vado Del Rio Rd	2,000	235	157	A	A	244	162	B	A

Bridge Alignment B - East Curve Alignment. The construction related trips and resulting traffic impacts of Bridge Alignment 2B would be the same as Alternatives 3B and 1B.

4.5.2.9 Alternative 2C [Levee Alignment 2 + Bridge Alignment C]

While the construction related traffic impacts of Alternative 2C would be higher overall due to Bridge Alignment C associated with this alternative, the impacts would not be substantially greater than the other alternatives involving the same bridge alignment. The impacts shown on Table 4.5-9 indicate that there would be no significant loss of LOS on the key roads in the project area.

Levee Alignment 3. Levee Alignment 2 would generate the same traffic impacts as described for Alternatives 2A and 2B.

Stormwater Management System. Traffic impacts from construction generated trips for the Stormwater Management System would be similar to those described for Alternative 1C.

Table 4.5-9

Average Peak-Hour Traffic Volumes on Key Roads for Alternative 2C

		1998				1999			
		Traffic		LOS		Traffic		LOS	
	Capacity	AM	PM	AM	PM	AM	PM	AM	PM
Vandegrift Blvd, Oceanside Gate to Stuart Mesa/Ash Road	5,400	2,347	1,888	B	B	2,419	1,943	B	B
Vandegrift Blvd, Stuart Mesa/Ash Road to 9th Street	3,600	2,325	1,798	C	B	2,396	1,851	C	C
Vandegrift Blvd, 9th Street to Basilone Road	3,200	1,557	1,445	B	B	1,602	1,486	B	B
Vandegrift Blvd, Rattlesnake Canyon Rd to Basilone Rd	3,200	1,747	1,871	C	C	1,799	1,927	C	C
Basilone Rd, Vandegrift Blvd to Vado Del Rio Rd.	2,000	216	216	A	A	210	210	A	A
Rattlesnake Canyon Rd	2,200	1,727	1,559	D	D	1,788	1,614	E	D
Stagecoach Rd	2,000	339	339	A	A	351	351	A	A
Vado Del Rio Rd	2,000	235	157	A	A	244	162	A	A

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Bridge Alignment C would contribute the same traffic impacts to Alternative 2C as those described in Alternatives 3C and 1C.

4.5.2.10 No Action Alternative

With the No Action Alternative, the expected growth due to base population and developments unrelated to the Flood Control Project (P-010) and the Bridge Replacement Project (P-030) would lead to increases in traffic volumes through the 1998-1999 construction period.

With the No Action Alternative, none of the key road segments would experience a significant change in LOS without the project.

4.5.3 Mitigation Measures

There are no mitigation measures required because the Proposed Action and alternatives would not result in any significant impacts to traffic. Standard construction practices for traffic management including transportation system management, such as detours, temporary construction road, changes in signalization, etc.; and the traffic demand management, such as staggered work scheduled, off-peak truck deliveries, etc., have been assumed as part of the project.

4.5.4 Analysis of Significance

There are no significant impacts associated with traffic.

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4.6 NOISE

4.6.1 Criteria for Significance Determination

Environmental impact analysis related to noise includes potential effects on the local human and threatened or endangered wildlife species. Noise is defined as unwanted sound that interferes with normal human activities, such as sleep or speech, or otherwise diminishes the quality of the environment. Most of the ambient noise in the project area is generated by aircraft operations at MCAS Camp Pendleton.

Populations which may be affected are known as sensitive receptors. The sensitive receptors which have been defined for the proposed project include people and activities at Chappo (22) Area, MCAS Camp Pendleton (23) Area, 24 Area, Vado del Rio (25) Area, Camp Santa Margarita (33) Area, and the Santa Margarita Ranch House complex on the Base. The nearest offbase populated areas are approximately 5 miles (8.04 kilometers) from the project area. These areas include the City of San Clemente to the north, the City of Oceanside to the south, and the unincorporated community of Fallbrook to the east. Based on Air Installation Compatible Use Zone (AICUZ) guidelines, noise levels at residential, hospital, school or outdoor recreation uses should not exceed 65 decibels (dB).

Local populations of the least Bell's vireo are sensitive receptors in the project area. The USFWS has used 60 dB as a practical threshold above which impacts to the least Bell's vireo may occur during breeding season (15 March through 31 August). However, annual species surveys at the MCB Camp Pendleton and MCAS Camp Pendleton indicate that the presence of traffic noise of approximately 69 dB and helicopter activity with noise levels as high as 70 to 80 dB in the Santa Margarita River channel adjacent to MCAS Camp Pendleton has not precluded a substantial increase in the least Bell's vireo population within the Santa Margarita River valley since 1981 (U.S. Fish and Wildlife Service, 1995). Nesting has occurred in habitat adjacent to MCAS Camp Pendleton every year since 1981. Annual survey maps indicate that the concentration of nesting least Bell's vireo appears to be influenced by the quality of riparian habitat, rather than the presence of noise levels above 60dB. Therefore, noise impacts could be considered significant if ambient noise levels, which are currently above 60 dB in the project area, are increased significantly.

Southwestern willow flycatcher, arroyo southwestern toad, and the coastal California gnatcatcher are also in the project area. These species have breeding periods between 15 February and 31 August. As with the least Bell's vireo, significant impacts to these sensitive wildlife species could occur if ambient noise levels are increased significantly.

Because noise impacts are determined at the sensitive receptor location, not the source, the distance between the source and sensitive receptor is important. Table 4.6-1 shows typical construction noise levels at 50 feet from the source.

Table 4.6-1
Construction Equipment Noise Levels

Equipment	Range of Noise Level at 50 feet (dBA)	Energy-Equivalent Continuous Noise Level (L_{eq}) at 50 feet (dBA)
Earthmoving		
Front Loaders	71 to 96	82
Backhoes	71 to 93	85
Bulldozers	72 to 96	86
Tractors	72 to 96	84
Scrapers	73 to 95	88
Graders	73 to 95	88
Truck/Trailer	70 to 92	82
Paver	80 to 92	89
Truck	76 to 85	80
Roller	78 to 84	79
Materials Handling		
Concrete Mixer	70 to 90	85
Concrete Pump	74 to 84	82
Crane, Movable	75 to 95	80
Derrick	86 to 89	88
Water Truck	79 to 88	84
Side Boom	80 to 90	85
Stationary Sources		
Generators	69 to 81	76
Compressors	68 to 87	78
Impact		
Pile Drivers (peak level)	90 to 104	101
Steam Boiler (pile driver)	83 to 92	88
Jackhammers	75 to 104	88
Rock Drills	90 to 105	98
Pneumatic Tools	82 to 88	86
Compactor	84 to 90	86

Source: U.S. Environmental Protection Agency, 1971

Construction noise contours were developed using a generalized construction scenario, with up to 10 assorted pieces of heavy equipment operating at one time. Noise dissipates at a rate of 5 to 6 dB with each doubling of distance. Thus, the 65 dB contour for construction noise was estimated to be between 525 and 600 feet from the limits of construction, while the 60 dB contour was estimated to be 900 to 1,000 feet from the limits of construction.

In community noise assessment, changes in noise levels greater than 3 decibels on the A-weighted scale (dBA) are often identified as significant, while changes of less than 1 dBA will not be discernible to local residents. In the range of 1 to 3 dBA, residents who are very sensitive to noise may perceive a slight change.

4.6.2 Impact Analysis

The nearest offbase receptors are approximately 5 miles from the construction site. This distance would attenuate noise generated by the construction and operation of the levee, stormwater management system, and bridge. Therefore, no noise impacts are expected to offbase receptors for any alternative.

4.6.2.1 Alternative 3A [Levee Alignment 3 + Bridge Alignment A] – Preferred Alternative

Levee Alignment 3. The predominant noise source associated with Levee Alignment 3 would be from construction activity, which would temporarily raise ambient noise levels. The proposed construction of Levee Alignment 3 would take approximately 24 months starting in Fiscal Year (FY) 1998 and ending in FY 2000. However, the majority of construction involving heavy equipment would occur during the first 18 months of the proposed project schedule, while limited use of heavy equipment would occur during the latter 6 months. The closest human sensitive receptors to the proposed levee construction corridor are the bachelor enlisted quarters (BEQ) in the Chappo (24) Area and the Santa Margarita Ranch House complex, which is used as a residence. The BEQ is over 2,600 feet from the proposed levee construction corridor, well outside the 65-dB noise range. Therefore, increases in noise levels would be extremely small, less than 1 dB, and no significant noise impacts are expected from the proposed levee construction activities. The Santa Margarita Ranch House complex is approximately 50 feet from the proposed levee construction corridor and has a background noise level of 65 dB. Noise from construction activities would be noticeable at the Santa Margarita Ranch House complex during the daytime hours. No construction would occur at night. No operational noise emissions are expected from the levee.

The closest sensitive receptors to the guide vane structure are the BEQs in the Chappo (22) Area and the Santa Margarita Ranch House complex. Noise impacts to these receptors would be the same as those discussed for the levee.

The proposed Chappo (22) Area borrow area is located approximately 500 feet from the BEQ area. Noise levels at this distance from construction equipment would be between 65 and 67 dB. Because the dB noise measurement is logarithmic, the addition of the construction noise source would result in an increase of approximately 1 dB from background levels. This increase would barely be perceptible and would not be significant.

The proposed concrete batch plant would be located in the Chappo (22) Area, and would be a minimum of 1,500 feet from the BEQ area. At this distance, background noise levels would not significantly increase at the BEQ area.

Construction traffic would primarily be along Basilone Road and Vandegrift Boulevard, although Rifle Range and Wilcox Range roads would be used for borrow site access. The closest sensitive receptors to any of these roads are the BEQs in 24 Area, which are approximately 500 feet from Vandegrift Boulevard. The short-term increase in traffic noise along these roadways would not result in a significant increase in traffic noise.

The proposed levee would be constructed in the river channel during the drier period of the year when river levels are low. This would partially coincide with the breeding periods for the least Bell's vireo, southwestern willow flycatcher, coastal California gnatcatcher, and the arroyo southwestern toad (between 15 February and 31 August). Background noise levels in the river channel are currently 60 to 70 dB. Noise levels within 50 feet of the construction site would be approximately 85 dB. Because background noise levels in the river channel are high due to its proximity to the airfield, the overall noise level in the channel would be increased by approximately 1 dB, which is not considered a significant noise increase.

Stormwater Management System. Construction activities for the stormwater management system would occur in an area with a high background noise level (between 60 and 70 dB). The nearest sensitive human receptors are in the Chappo (22) Area BEQs, over 1 mile away from the pump station. Increases in noise levels would not be noticeable and no significant increases would occur to sensitive human receptors.

Southwestern willow flycatcher nests were located near the proposed site for the floodwall and pump station during 1995 surveys. Impacts would be similar to those described for levee construction.

Operational impacts would be limited to stationary equipment sources, such as diesel motors associated with the pump station. The pump station design incorporates two main duty 200-hp electric pumps and six 400-hp diesel pumps. Operation of the pump station would be limited in duration (typically less than 15 continuous days), corresponding with large storm events. Maintenance activities would involve running each pump once a month for one hour and once every

six months for 8 hours. The pump station would be installed below grade; however, the motors would be situated above the ground to facilitate ventilation and cooling. The pumps would be fully enclosed by a masonry block structure. Proper enclosure of the pump station equipment would effectively reduce noise levels to acceptable levels. Therefore, no significant impacts from operational noise would occur.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. Replacing Basilone Road Bridge at the existing alignment would produce temporary, short-term noise during construction. The closest sensitive receptors to the existing bridge alignment are the BEQs at Vado del Rio (25) Area, approximately 2,000 feet from the construction area, and the Santa Margarita Ranch House complex, over 1,000 feet from the construction area. Both these areas are well outside the 65 dB noise level limit from construction noise. Any increases in existing noise levels from the replacement of Basilone Road Bridge at the existing alignment would be barely perceptible.

Construction impacts to sensitive wildlife species would be similar to those discussed for Levee Alignment 3.

Operational noise from traffic on the bridge would remain the same as current levels because traffic is not expected to increase as a result of the project. Raising the bridge elevation by approximately 12 feet would sightly decrease potential indirect noise impact on wildlife by increasing the grade separation between the riparian habitat and the roadway. No significant impacts are anticipated.

4.6.2.2 Alternative 3B [Levee Alignment 3 + Bridge Alignment B]

Levee Alignment 3. Alternative 3B would include the same levee alignment discussed in Alternative 3A. No significant noise impacts would occur from construction and operational activities.

Stormwater Management System. Alternative 3B would include the same stormwater management system discussed in Alternative 3A. No significant noise impacts would occur from construction or operational activities.

Bridge Alignment B - East Curve Alignment. Bridge Alignment B would produce temporary, short-term noise during construction. The closest sensitive receptors to the existing bridge alignment are the BEQs at Vado del Rio (25) Area, approximately 2,000 feet from the construction area, and the Santa Margarita Ranch House complex, over 750 feet from the construction area. Both these areas are well outside the 65 dB noise level limit from construction noise. Any increases in existing noise levels from the construction of Bridge Alignment B would be barely perceptible.

Construction impacts on sensitive wildlife species would be similar to those discussed for Levee Alignment 3.

Shifting the bridge alignment eastward would shift vehicle noise closer to the nearest sensitive receptors, the Santa Margarita Ranch House complex, which would be approximately 750 feet from the new road alignment. This distance would attenuate any noise generated by traffic and no significant increases to existing noise levels are expected.

4.6.2.3 Alternative 3C [Levee Alignment 3 + Bridge Alignment C]

Levee Alignment 3. Alternative 3C would include the same levee alignment discussed in Alternative 3A. No significant noise impacts would occur from construction and operational activities.

Stormwater Management System. Alternative 3C would include the same stormwater management system discussed in Alternative 3A. No significant noise impacts would occur from construction or operational activities.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Bridge Alignment C would produce temporary, short-term noise during construction. The closest sensitive receptors to the existing bridge alignment are the BEQs at Vado del Rio (25) Area, approximately 500 feet from the construction area, the hospital at the headquarters area, over 1 mile from the construction area, and the Santa Margarita Ranch House complex, over 1,500 feet from the construction area. Both these areas are well outside the 65 dB noise level limit from construction noise. Any increases in existing noise levels from the construction of Bridge Alignment C would be barely perceptible.

Construction impacts on sensitive wildlife species would be similar to those discussed for Levee Alignment 3.

Shifting the bridge alignment to Rattlesnake Canyon would shift vehicle noise closer to the nearest sensitive receptors, the BEQs at the Vado del Rio (25) Area, which would be approximately 500 feet from the new road alignment. This distance would attenuate any noise generated by traffic and no significant increases to existing noise levels are expected.

4.6.2.4 Alternative 1A [Levee Alignment 1 + Bridge Alignment A]

Levee Alignment 1. The predominant noise source associated with Levee Alignment 1 would be from construction activity, which would temporarily raise ambient noise levels. The proposed construction of Levee Alignment 1 would have approximately the same construction schedule as Levee Alignment 3. The closest sensitive receptors to the proposed levee construction corridor are

the BEQs in the Chappo (24) Area, approximately 2,600 feet from the proposed alignment, and the Santa Margarita Ranch House complex, approximately 50 feet from the proposed alignment. The proposed levee would terminate at the edge of 26 Area. However, this area contains only warehousing, shops, and other industrial uses and no sensitive receptors are present. Increases in noise levels would be extremely small at the Chappo (24) Area BEQs, less than 1 dB, and no significant noise impacts are expected from the proposed levee construction activities. Noise from construction activities will be noticeable at the Santa Margarita Ranch House complex during the daytime hours. No construction would occur at night. No operational noise emissions are expected from the levee.

Grading activities associated with this levee alignment would occur approximately 700 feet from the nearest sensitive receptors, the BEQs at Vado del Rio (25) Area. No significant changes in noise level are expected.

There are no sensitive human receptors near the spur dikes/silt fences. Therefore, no noise impacts are expected.

Noise impacts related to the use of the Chappo (22) Area borrow site and the concrete batch plant in Chappo (22) Area would be the same as those described for Alternative 3A and are not expected to be significant. In addition to the borrow site at Chappo (22) Area, the East Oscar borrow area would be used for this alternative. The proposed East Oscar borrow area is located over 1.5 miles from the nearest residential area, which is the BEQ area located in the Camp Santa Margarita (33) Area. Noise level increases in the BEQ area would be extremely small, less than 1 dB. Therefore, no significant increases are expected with the operation of the East Oscar borrow area.

The proposed levee would be constructed in the river channel during the drier period of the year when river levels are low. This would partially coincide with the breeding periods for the least Bell's vireo, southwestern willow flycatcher, coastal California gnatcatcher, and the arroyo southwestern toad (between 15 February and 31 August). Background noise levels in the river channel are currently 60 to 70 dB. Noise levels within 50 feet of the construction site would be approximately 85 dB. Because background noise levels in the river channel are high due to its proximity to the airfield, the overall noise level in the channel would be increased by approximately 1 dB, which is not considered a significant noise increase. However, because three spur dikes/silt fences are proposed in addition to the levee, any disturbance would occur over a larger area than Levee Alignment 3.

Stormwater Management System. Construction activities for the pump station would occur in an area with a high background noise level (between 60 and 70 dB). The nearest sensitive human receptors are in the Chappo (22) Area BEQs, over 1 mile away from the pump station. The use of

the detainage area would not result in any construction related noise impacts. Increases in noise levels would not be noticeable and no significant increases would occur to sensitive human receptors.

Southwestern willow flycatcher have nested near the proposed site for the pump station. Impacts would be similar to those described for levee construction.

Operational impacts would be limited to stationary equipment sources, such as diesel motors associated with the pump station. The pump station design incorporates two 100 hp electric-driven main duty pumps and six 200-hp diesel pumps, which are two fewer engines with considerably smaller horsepower than would be required for the stormwater management system associated with Levee Alignment 3. Operation of the pump station would be limited in duration (typically less than 15 continuous days), corresponding with large storm events. Maintenance activities would involve running each pump once a month for one hour and once every six months for 8 hours. The pump station would be installed below grade; however, the motors would be situated above the ground to facilitate ventilation and cooling. The pumps would be fully enclosed by a masonry block structure. Proper enclosure of the pump station equipment would effectively reduce noise levels to acceptable levels. Therefore, no significant impacts from operational noise would occur.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. Replacing Basilone Road Bridge at the existing alignment would produce temporary, short-term noise during construction. The closest sensitive receptors to the existing bridge alignment are the BEQs at Vado del Rio (25) Area, approximately 2,000 feet from the construction area, and the Santa Margarita Ranch House complex, over 1,000 feet from the construction area. Both these areas are well outside the 65 dB noise level limit from construction noise and any increases in existing noise levels from the replacement of Basilone Road Bridge at the existing alignment would be barely perceptible.

Construction impacts on sensitive wildlife species would be similar to those discussed for Levee Alignment 1.

Operational noise from traffic on the bridge would remain the same as current levels because traffic is not expected to increase as a result of the project. Raising the bridge elevation by approximately 12 feet would sightly decrease potential indirect noise impact on wildlife by increasing the grade separation between the riparian habitat and the roadway. No significant impacts are anticipated.

4.6.2.5 Alternative 1B [Levee Alignment 1 + Bridge Alignment B]

Levee Alignment 1. Alternative 1B would include the same levee alignment discussed in Alternative 1A. No significant noise impacts would occur from construction and operational activities.

Stormwater Management System. Alternative 1B would include the same stormwater management system discussed in Alternative 1A. No significant noise impacts would occur from construction or operational activities.

Bridge Alignment B - East Curve Alignment. Bridge Alignment B would produce temporary, short-term noise during construction. The closest sensitive receptors to the existing bridge alignment are the BEQs at Vado del Rio (25) Area, approximately 2,000 feet from the construction area, and the Santa Margarita Ranch House complex, over 750 feet from the construction area. Both these areas are well outside the 65 dB noise level limit from construction noise and any increases in existing noise levels from the construction of Bridge Alignment B would be barely perceptible.

Construction impacts on sensitive wildlife species would be similar to those discussed for Levee Alignment 1.

Shifting the bridge alignment eastward would shift vehicle noise closer to the nearest sensitive receptors, the Santa Margarita Ranch House complex, which would be approximately 750 feet from the new road alignment. This distance would attenuate any noise generated by traffic and no significant increases to existing noise levels are expected.

4.6.2.6 Alternative 1C [Levee Alignment 1 + Bridge Alignment C]

Levee Alignment 1. Alternative 1C would include the same levee alignment discussed in Alternative 1A. No significant noise impacts would occur from construction and operational activities.

Stormwater Management System. Alternative 2C would include the same stormwater management system discussed in Alternative 2A. No significant noise impacts would occur from construction or operational activities.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Bridge Alignment C would produce temporary, short-term noise during construction. The closest sensitive receptors to the existing bridge alignment are the BEQs at Vado del Rio (25) Area, approximately 500 feet from the construction area, the hospital at the headquarters area, over 1 mile from the construction area, and the Santa Margarita Ranch House complex, over 1,500 feet from the construction area. Both these areas are well outside the 65 dB noise level limit from construction noise and any increases in existing noise levels from the construction of Bridge Alignment C would be barely perceptible.

Construction impacts on sensitive wildlife species would be similar to those discussed for Levee Alignment 1.

Shifting the bridge alignment to Rattlesnake Canyon would shift vehicle noise closer to the nearest sensitive receptors, the BEQs at the Vado del Rio (25) Area, which would be approximately 500 feet from the new road alignment. This distance would attenuate any noise generated by traffic and no significant increases to existing noise levels are expected.

4.6.2.7 Alternative 2A [Levee Alignment 2 + Bridge Alignment A]

Levee Alignment 2. The predominant noise source associated with Levee Alignment 2 would be from construction activity, which would temporarily raise ambient noise levels. The proposed construction of Levee Alignment 2 would have approximately the same construction schedule as Levee Alignment 3. The closest sensitive receptors to the proposed levee construction corridor are the BEQs in the Chappo (24) Area, approximately 2,600 feet from the proposed alignment, and the Santa Margarita Ranch House complex, approximately 50 feet from the proposed alignment. Increases in noise levels would be extremely small at the Chappo (24) Area BEQs, less than 1 dB, and no significant noise impacts are expected from the proposed levee construction activities. Noise from construction activities would be noticeable at the Santa Margarita Ranch House complex during the daytime hours. No construction would occur at night. No operational noise emissions are expected from the levee.

There are no sensitive receptors near the proposed spur dikes/silt fences. Therefore, no noise impacts are expected.

Noise impacts related to the use of the borrow site and the concrete batch plant at the Chappo (22) Area would be similar to those described for Levee Alignment 3 and would not be significant.

The proposed levee would be constructed in the river channel during the drier period of the year when river levels are low. This would partially coincide with the breeding periods for the least Bell's vireo, southwestern willow flycatcher, coastal California gnatcatcher, and the arroyo southwestern toad (between 15 February and 31 August). Background noise levels in the river channel are currently 60 to 70 dB. Noise levels within 50 feet of the construction site would be approximately 85 dB. Because background noise levels in the river channel are high due to its proximity to the airfield, the overall noise level in the channel would be increased by approximately 1 dB, which is not considered a significant noise increase. However, because six spur dikes/silt fences are proposed in addition to the levee, any disturbance would occur over a larger area than Levee Alignment 3 or Levee Alignment 1.

Stormwater Management System. Construction activities for the pump station would occur in an area with a high background noise level (between 60 and 70 dB). The nearest sensitive human receptors are in the Chappo (22) Area BEQs, over 1 mile away from the pump station. Increases in

noise levels would not be noticeable and no significant increases would occur to sensitive human receptors.

Southwestern willow flycatcher nests are located near the proposed site for the pump station. Impacts would be similar to those described for levee construction.

Operational impacts would be limited to stationary equipment sources, such as diesel motors associated with the pump station. The pump station design incorporates two 100-hp electric-driven main duty pumps and six 200-hp diesel engines, which are two fewer engines with considerably smaller horsepower than would be required for the stormwater management system associated with Levee Alignment 3. Operation of the pump station would be limited in duration (typically less than 15 continuous days), corresponding with large storm events. Maintenance activities would involve running each pump once a month for one hour and once every six months for 8 hours. The pump station would be installed below grade; however, the motors would be situated above the ground to facilitate ventilation and cooling. The pumps would be fully enclosed by a masonry block structure. Proper enclosure of the pump station equipment would effectively reduce noise levels to acceptable levels. Therefore, no significant impacts from operational noise would occur.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. Replacing Basilone Road Bridge at the existing alignment would produce temporary, short-term noise during construction. The closest sensitive receptors to the existing bridge alignment are the BEQs at Vado del Rio (25) Area, approximately 2,000 feet from the construction area, and the Santa Margarita Ranch House complex, over 1,000 feet from the construction area. Both these areas are well outside the 65 dB noise level limit from construction noise and any increases in existing noise levels from the replacement of Basilone Road Bridge at the existing alignment would be barely perceptible.

Construction impacts on sensitive wildlife species would be similar to those discussed for Levee Alignment 2.

Operational noise from traffic on the bridge would remain the same as current levels because traffic is not expected to increase as a result of the project. Raising the bridge elevation by approximately 12 feet would sightly decrease potential indirect noise impact on wildlife by increasing the grade separation between the riparian habitat and the roadway. No significant impacts are anticipated.

4.6.2.8 Alternative 2B [Levee Alignment 2 + Bridge Alignment B]

Levee Alignment 2. Alternative 2B would include the same levee alignment discussed in Alternative 2A. No significant noise impacts would occur from construction and operational activities.

Stormwater Management System. Alternative 2B would include the same stormwater management system discussed in Alternative 2A. No significant noise impacts would occur from construction or operational activities.

Bridge Alignment B - East Curve Alignment. Bridge Alignment B would produce temporary, short-term noise during construction. The closest sensitive receptors to the existing bridge alignment are the BEQs at Vado del Rio (25) Area, approximately 2,000 feet from the construction area, and the Santa Margarita Ranch House complex, over 750 feet from the construction area. Both these areas are well outside the 65 dB noise level limit from construction noise and any increases in existing noise levels from the construction of Bridge Alignment B would be barely perceptible.

Construction impacts on sensitive wildlife species would be similar to those discussed for Levee Alignment 2.

Shifting the bridge alignment eastward would shift vehicle noise closer to the nearest sensitive receptors, the Santa Margarita Ranch House complex, which would be approximately 750 feet from the new road alignment. This distance would attenuate any noise generated by traffic and no significant increases to existing noise levels are expected.

4.6.2.9 Alternative 2C [Levee Alignment 2 + Bridge Alignment C]

Levee Alignment 2. Alternative 2C would include the same levee alignment discussed in Alternative 2A. No significant noise impacts would occur from construction and operational activities.

Stormwater Management System. Alternative 2C would include the same stormwater management system discussed in Alternative 2A. No significant noise impacts would occur from construction or operational activities.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Bridge Alignment C would produce temporary, short-term noise during construction. The closest sensitive receptors to the existing bridge alignment are the BEQs at Vado del Rio (25) Area, approximately 500 feet from the construction area, the hospital at the headquarters area, over 1 mile from the construction area, and the Santa Margarita Ranch House complex, over 1,500 feet from the construction area. Both these areas are well outside the 65 dB noise level limit from construction noise and any increases in existing noise levels from the construction of Bridge Alignment C would be barely perceptible.

Construction impacts on sensitive wildlife species would be similar to those discussed for Levee Alignment 2.

Shifting the bridge alignment to Rattlesnake Canyon would shift vehicle noise closer to the nearest sensitive receptors, the BEQs at the Vado del Rio (25) Area, which would be approximately 500 feet from the new road alignment. This distance would attenuate any noise generated by traffic and no significant increases to existing noise levels are expected.

4.6.2.10 No Action Alternative

Under the No Action Alternative, none of the proposed flood control project components would be installed. Similar to the proposed action, no operational noise would be produced. By not constructing any improvements, indirect noise impacts to sensitive wildlife habitat would be avoided.

4.6.3 Analysis of Significance

Construction of the flood control improvement component and the bridge replacement project would result in noise impacts to sensitive wildlife with habitats in the project areas. Even though these project components have been sited to minimize intrusion to these sensitive habitats, the location of the project cannot completely avoid them. Mitigation measures in Section 4.3, Biological Resources, require compensation for habitat lost as a result of the proposed project and avoidance of certain construction activities during the most sensitive periods for the California gnatcatcher. The mitigation measures would reduce the noise impacts to levels below significance.

4.6.4 Mitigation Measures

Mitigation measures recommended in the Biological Resources analysis, Section 4.3 , to mitigate impacts to sensitive wildlife shall be implemented. These mitigations include habitat compensation, construction monitoring, and project planning to avoid construction activity, particularly clearing and grubbing activities, during breeding seasons.

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4.7 AIR QUALITY

4.7.1 Criteria for Significance Determination

Potential air quality impacts are generally considered significant if a proposed project would cause ambient air quality standards to be exceeded, would increase the frequency of severity of an existing violation, or would delay the timely attainment of a standard.

4.7.2 Impacts

Air quality impacts are generally categorized as either short or long term. The first category is short-term construction-related impacts. Air pollutants would be generated by the operation of construction equipment at the sites and emitted into the atmosphere (exhaust emissions). Secondary construction-related emissions would occur in the form of fugitive dust from excavation, grading, and the loading and unloading of soil from scrapers and trucks. Air pollutants would also be emitted by offsite material delivery trucks and from vehicles used by construction workers commuting to and from work. Long-term impacts would occur once construction is completed and the flood control system is placed into operation. Stationary source emissions, such as the diesel pumps, would contribute to long-term impacts.

4.7.3 Emissions Estimate Methodology

Emission estimates were made for the combined projects P-010 and P-030. It was assumed the projects would take two calendar years to complete (Winzler & Kelly, 1996) with each year consisting of 180 construction days. The number of available construction days was estimated by subtracting from the number of calendar days, the number of days that construction work could not be performed during the winter when water is in the river, and the number of weekend days and holidays. Construction equipment was assumed to operate 8 hours per day.

Exhaust emission from construction equipment, trucks, and other motor vehicles consist of carbon monoxide (CO), reactive organic gases (ROG), nitrogen oxides (NO_x), sulfur oxides, and particulate matter with a diameter of 10 micrometers or less (PM_{10}). The calculation of emission rates of exhaust pollutants from construction equipment (scrapers and bulldozers) was based on emission factors provided in the U. S. Environment Protection Agency (EPA) document AP-42, *Compilation of Air Pollutant Emission Factors, Volume II* (1985).

It was assumed that a total of 20 pieces of heavy equipment, in addition to the bulldozers and scrapers, would be operating in the project areas. For purposes of this analyses, it was assumed that each piece of equipment averages 75 Brake Horsepower Hour (BHP-HR) of energy expenditures per

hour during an 8-hour workday for a total energy expenditure of 12,000 BHP-HRs. Using typical emission factors provided in the South Coast Air Quality Management (SCAQMD) CEQA Handbook (1993), Table A9-3-A, the exhaust emissions were calculated for this fleet of construction equipment.

For highway vehicles (worker commuting vehicles and material delivery trucks) typical emission factors were obtained from the EMFAC7EP emission factor tables in the SCAQMD CEQA Handbook (1993).

Fugitive dust generated during excavation, loading and dumping, and other earthmoving operations would be dependent on a number of factors, including silt and moisture content of the soil, wind speed, and acreage disturbed. Two procedures were used to estimate emissions from the construction sites. The first procedure used a PM_{10} emission factors of 26.4 lbs per acre per day. This was derived from the EPA total suspended particulate (TSP) emissions factor of 1.2 tons per acre per month of activity provided in the EPA publication AP-42, Volume I (U.S. Environmental Protection Agency, 1995). It was assumed that 25 percent of the TSP was PM_{10} (U.S. Environmental Protection Agency, 1988).

The second procedure accounted for fugitive dust produced by soil excavation, dumping, and placement. The emission factors used for these operations were obtained from AP42, Volume I, Table 11.9-4 (U.S. Environmental Protection Agency, 1995). There emission factors are for TSP and are expressed in units of pounds TSP/per ton of soil, to convert the TSP emissions to PM_{10} emissions. It was also assumed that PM_{10} was 25 percent of TSP emissions.

The San Diego Air Pollution Control District (SDAPCD) requires that water be applied to disturbed ground surfaces to reduce PM_{10} emissions. For this project it was assumed that watering would reduce PM_{10} emissions by 50 percent. This reduction was included in all PM_{10} calculations.

4.7.4 Alternative 3A [Levee Alignment 3 + Bridge Alignment A] Preferred Alternative

4.7.4.1 Construction Impacts

The emission estimates for this alternative are for both the Santa Margarita River Flood Control Project (P-010) and the Basilone Road Bridge Replacement Project (P-030). From the construction requirements for this alternative described in Section 2.3.1.4, the following assumptions were made for the emission calculations:

- 34 material truck delivery trips per day from Oceanside (round trip-40 miles)

- 3 trips per day by onbase dump trucks from the Chappo (22) Area borrow site (round trip-12 miles)
- 7 scrapers, 8 hours/day
- 2 bulldozers, 8 hours/day
- 20 other pieces of construction equipment, 8 hours/day
- 150 construction worker vehicles traveling 50 miles per day
- 3,183 tons of soil excavated, dumped, and placed each day
- 11.2 acres disturbed each day

The results of the construction emission calculations are presented in Table 4.7.4-1.

Table 4.7.4-1
Typical Daily Construction Emission
(Vehicle Exhaust and Fugitive Dust) from Alternative 3A
(pounds per day)

Source	CO	ROG	NO_x	SO_x	PM_{10}
Material Delivery Trucks	22.70	2.70	13.64	—	1.39
Construction Worker Vehicles	42.16	2.15	6.61	—	1.74
Scrapers	70.39	23.80	215.04	24.25	22.74
Bulldozers	57.44	3.49	20.30	1.44	2.18
Other Construction Equipment (1)	23.56	7.30	103.55	7.20	3.64
Soil Disturbance	—	—	—	—	176.49
Total	**216.25**	**39.44**	**359.14**	**32.89**	**208.18**

(1)Compactors, Backhoe/Trencher, Frontend Loader, Mobile Crane, Pile Driver, Portable Generator, Water Trucks, and onbase Dump Truck.

Emissions from the two proposed projects, when compared with the daily emissions in the San Diego air basin (Table 4.7.4-2), would be quite small. Project emissions comprise less than 0.01 percent of the CO and ROG burdens, 0.09 percent of the NO_x burden, 0.14 percent of the SO_x burden, and 0.03 percent of the PM_{10} burden. Thus, regional air quality impacts would be small. Also local air quality impacts would not be significant, because construction emissions would be spread over a large area, and dispersion conditions are good during the daytime hours. Thus,

pollutant concentrations at the base boundary and beyond should be relatively low and should not produce any new or additional violations of air quality standards (Table 3.7-1). Also, the emissions would cease after the construction work is completed.

Table 4.7.4-2
San Diego County Daily Emissions (1994)
(pounds per day)

Source	CO	ROG	NO_x	SO_x	PM_{10}
Stationary	42,000	102,000	32,000	2,800	9,200
Area-wide	220,000	100,000	9,000	600	600,000
Mobile	2,400,000	300,000	340,000	20,000	28,000
Total	**2,662,000**	**502,000**	**381,000**	**23,400**	**637,200**

Source: San Diego Air Pollution Control District (1997).

4.7.4.2 Operation Impacts

The stormwater management system would consist of a pump station with two, 200-hp, electric-driven main duty pumps, which would be utilized to manage all normal runoff. Five, 400-hp diesel fired emergency pumps would be available for use in an unforeseen flood situation. A sixth, 400-hp diesel fired emergency pump would be available to provide standby service, in the event of failure of one of the other emergency pumps in a flood situation.

Testing and maintenance requirements would include running each emergency pump consecutively for 15 minutes once a month. MCB Camp Pendleton would obtain an operating permit or a certificate of registration from the SDAPCD for these emergency pumps. Best available control technology (BACT) would be applied to all diesel-driven engines.

SDAPCD rules establish thresholds on a daily basis. For stationary sources, SDAPCD rules establish the following thresholds:

- CO: 550 pounds/day
- NO_X: 250 pounds/day
- PM_{10}: 250 pounds/day
- ROG: 250 pounds/day
- SO_X: 250 pounds/day

All six diesel-powered pumps could be simultaneously run 1 hour per day under these thresholds. Under emergency conditions (i.e., flooding) these thresholds do not apply. Thus, there would be no

significant long-term air quality impacts resulting from the operations of the stormwater management system.

4.7.5 Alternative 3B [Levee Alignment 3 + Bridge Alignment B]

4.7.5.1 Construction Impacts

This alternative would be similar to Alternative 3A except it would require 56 more trips to deliver material for bridge construction. Over the two years construction period, this equates to an additional truck delivery about once every six days. This would result in slightly higher emissions for this alternative than for Alternative 3A. However, for practical purposes the emissions for Alternative 3B would be the same as those from Alternative 3A. Thus, the air quality impacts would be the same; i.e., not significant (Section 4.7.4.1).

4.7.5.2 Operation Impacts

Since the stormwater management system is the same for this alternative as for Alternative 3A, the air quality impacts would be the same; i.e., not significant (Section 4.7.4.2).

4.7.6 Alternative 3C [Levee Alignment 3 + Bridge Alignment C]

4.7.6.1 Construction Impacts

The emission estimates for this alternative are for both the Santa Margarita River Flood Control Project (P-010) and the Basilone Road Bridge Replacement Project (P-030). From the construction requirements for this alternative described in Section 2.3.3.3, the following assumptions were made for the emission calculations:

- 45 material truck delivery trips per day from Oceanside (round trip-40 miles)
- 3 trips per day by onbase dump trucks from the Chappo (22) Area borrow site (round trip-12 miles)
- 8 scrapers, 8 hours/day
- 2 bulldozers, 8 hours/day
- 20 other pieces of construction equipment, 8 hours/day

- 150 construction worker vehicles traveling 50 miles per day
- 3,306 tons of soil excavated, dumped, and placed each day
- 13.1 acres disturbed each day

The results of the construction emission calculations are presented in Table 4.7.6-1.

Table 4.7.6-1
Typical Daily Construction Emission
(Vehicle Exhaust and Fugitive Dust) from Alternative 3C
(pounds per day)

Source	CO	ROG	NO_x	SO_x	PM_{10}
Material Delivery Trucks	30.04	3.57	18.05	—	1.84
Construction Worker Vehicles	42.16	2.15	6.61	—	1.74
Scrapers	80.45	27.20	245.76	27.71	25.99
Bulldozers	57.44	3.49	20.30	1.44	2.18
Other Construction Equipment (1)	23.56	7.30	103.55	7.20	3.64
Soil Disturbance	—	—	—	—	202.68
Total	**233.65**	**43.71**	**394.27**	**36.35**	**238.07**

(1)Compactors, Backhoe/Trencher, Front-end Loader, Mobile Crane, Pile Driver, Portable Generator, Water Trucks, and onbase Dump Truck.

Emissions from the two proposed projects, when compared with the daily emissions in the San Diego air basin (Table 4.7.4-2), would be quite small. Project emissions comprise less than 0.01 percent of the CO and ROG burdens, 0.10 percent of the NO_x burden, 0.16 percent of the SO_x burden, and 0.04 percent of the PM_{10} burden. Thus, regional air quality impacts would be small. Also local air quality impacts would not be significant, because construction emissions would be spread over a large area, and dispersion conditions are good during the daytime hours. Thus, pollutant concentrations at the base boundary and beyond should be relatively low and should not produce any new or additional violations of air quality standards (Table 3.7-1). Also, the emissions would cease after the construction work is completed.

4.7.6.2 Operation Impacts

Since the stormwater management system is the same for this alternative as for Alternative 3A, the air quality impacts would be the same, i.e. not significant (Section 4.7.4.2).

4.7.7 Alternative 1A [Levee Alignment 1 + Bridge Alignment A]

4.7.7.1 Construction Impacts

The emission estimates for this alternative are for both the Santa Margarita River Flood Control Project (P-010) and the Basilone Road Bridge Replacement Project (P-030). From the construction requirements for this alternative described in Section 2.3.4.3, the following assumptions were made for the emission calculations:

- 42 material truck delivery trips per day from Oceanside (round trip-40 miles)
- 3 trips per day by onbase dump trucks from either East Oscar or Chappo (22) Area borrow site (round trip-12 miles)
- 9 scrapers, 8 hours/day
- 3 bulldozers, 8 hours/day
- 20 other pieces of construction equipment, 8 hours/day
- 150 construction worker vehicles traveling 50 miles per day
- 4,350 tons of soil excavated, dumped, and placed each day
- 12.2 acres disturbed each day

The results of the construction emission calculations are presented in Table 4.7.7-1.

Emissions from the two proposed projects, when compared with the daily emissions in the San Diego air basin (Table 4.7.4-2), would be quite small. Project emissions comprise less than 0.01 percent of the CO and ROG burdens, 0.11 percent of the NO_x burden, 0.17 percent of the SO_x burden, and 0.04 percent of the PM_{10} burden. Thus, regional air quality impacts would be small. Also local air quality impacts would not be significant, because construction emissions would be spread over a large area, and dispersion conditions are good during the daytime hours. Thus, pollutant concentrations at the base boundary and beyond should be relatively low and should not produce any new or additional violations of air quality standards (Table 3.7-1). Also, the emissions would cease after the construction work is completed.

Table 4.7.7-1
Typical Daily Construction Emission
(Vehicle Exhaust and Fugitive Dust) from Alternative 1A
(pounds per day)

Source	CO	ROG	NO_x	SO_x	PM_{10}
Material Delivery Trucks	28.04	3.34	16.85	—	1.72
Construction Worker Vehicles	42.16	2.15	6.61	—	1.74
Scrapers	90.50	30.60	276.48	31.18	29.24
Bulldozers	86.16	5.24	30.45	2.16	32.70
Other Construction Equipment [1]	23.56	7.30	103.55	7.20	3.64
Soil Disturbance	—	—	—	—	200.19
Total	**270.42**	**48.63**	**433.94**	**40.54**	**269.23**

[1]Compactors, Backhoe/Trencher, Front-end Loader, Mobile Crane, Pile Driver, Portable Generator, Water Trucks, and onbase Dump Truck.

4.7.7.2 Operation Impacts

The stormwater management system would consist of a pump station with two, 100-hp, electric driven main duty pumps to manage all normal runoff. Five, 200-hp diesel fired emergency pumps would be available for use in an unforeseen flood situation. A sixth, 200-hp diesel fired emergency pump would be available to provide standby service, in the event of failure of one of the other emergency pumps in a flood situation.

Testing and maintenance requirements would include running each emergency pump consecutively for 15 minutes once a month. MCB Camp Pendleton would obtain an operating permit or a certificate of registration from the SDAPCD for these emergency pumps. BACT would be applied to all diesel-driven engines.

Under SDAPCD established thresholds for daily emissions, all six pumps could be simultaneously run 1 hour per day. Under emergency conditions (i.e., flooding) these thresholds (see Section 4.7.4.2) do not apply. Thus, there would be no significant long-term air quality impacts resulting from the operations of the stormwater management system.

4.7.8 Alternative 1B [Levee Alignment 1 + Bridge Alignment B]

4.7.8.1 Construction Impacts

This alternative would be similar to Alternative 1A except it would require 56 more trips to deliver material for bridge construction. Over the two-year construction period, this equates to an additional truck delivery about once every six days. This would result in slightly higher emissions for this alternative than for Alternative 1A. However, for practical purposes the emissions for Alternative 1B would be the same as those from Alternative 1A. Thus, the air quality impacts would be the same; i.e., not significant (Section 4.7.7.1).

4.7.8.2 Operation Impacts

Since the stormwater management system is the same for this alternative as for Alternative 1A, the air quality impacts would be the same; i.e., not significant (Section 4.7.7.2).

4.7.9 Alternative 1C [Levee Alignment 1 + Bridge Alignment C]

4.7.9.1 Construction Impacts

The emission estimates for this alternative are for both the Santa Margarita River Flood Control Project (P-010) and the Basilone Road Bridge Replacement Project (P-030). From the construction requirements for this alternative described in Section 2.3.6.3, the following assumptions were made for the emission calculations:

- 49 material truck delivery trips per day from Oceanside (round trip-40 miles)
- 3 trips per day by onbase dump trucks from either East Oscar or Chappo (22)Area borrow site (round trip-12 miles)
- 9 scrapers, 8 hours/day
- 3 bulldozers, 8 hours/day
- 20 other pieces of construction equipment, 8 hours/day
- 150 construction worker vehicles traveling 50 miles per day

- 4,473 tons of soil excavated, dumped, and placed each day
- 14.1 acres disturbed each day

The results of the construction emission calculations are presented in Table 4.7.9-1.

Table 4.7.9-1
Typical Daily Construction Emission
(Vehicle Exhaust and Fugitive Dust) from Alternative 1C
(pounds per day)

Source	CO	ROG	NO_x	SO_x	PM_{10}
Material Delivery Trucks	32.71	3.89	19.66	—	2.00
Construction Worker Vehicles	42.16	2.15	6.61	—	1.74
Scrapers	90.50	30.60	276.48	31.18	29.24
Bulldozers	86.16	5.24	30.45	2.16	32.70
Other Construction Equipment [(1)]	23.56	7.30	103.55	7.20	3.64
Soil Disturbance	—	—	—	—	226.38
Total	**275.09**	**49.18**	**436.75**	**40.54**	**295.70**

[(1)]Compactors, Backhoe/Trencher, Front-end Loader, Mobile Crane, Pile Driver, Portable Generator, Water Trucks, and onbase Dump Truck.

Emissions from the two proposed projects, when compared with the daily emissions in the San Diego air basin (Table 4.7.4-2), would be quite small. Project emissions comprise less than 0.01 percent of the CO and ROG burdens, 0.11 percent of the NO_x burden, 0.17 percent of the SO_x burden, and 0.05 percent of the PM_{10} burden. Thus, regional air quality impacts would be small. Also local air quality impacts would not be significant, because construction emissions would be spread over a large area, and dispersion conditions are good during the daytime hours. Thus, pollutant concentrations at the base boundary and beyond should be relatively low and should not produce any new or additional violations of air quality standards (Table 3.7-1). Also, the emissions would cease after the construction work is completed.

4.7.9.2 Operation Impacts

Since the stormwater management system is the same for this alternative as for Alternative 1A, the air quality impacts would be the same, i.e. not significant (Section 4.7.7.2).

4.7.10 Alternative 2A [Levee Alignment 2 + Bridge Alignment A]

4.7.10.1 Construction Impacts

The emission estimate for this alternative are for both the Santa Margarita River Flood Control Project (P-010) and the Basilone Road Bridge Replacement Project (P-303). From the construction requirements for this alternative described in Section 2.3.7.3, the following assumptions were made for the emission calculations:

- 34 material truck delivery trips per day from Oceanside (round trip-40 miles)
- 3 trips per day by onbase dump trucks from Chappo (22) Area borrow site (round trip-12 miles)
- 7 scrapers, 8 hours/day
- 2 bulldozers, 8 hours/day
- 20 other pieces of construction equipment, 8 hours/day
- 150 construction worker vehicles traveling 50 miles per day
- 3,183 tons of soil excavated, dumped, and placed each day
- 11.2 acres disturbed each day

The results of the construction emission calculations are presented in Table 4.7.10-1.

Emissions from the two proposed projects, when compared with the daily emissions in the San Diego air basin (Table 4.7.4-2), would be quite small. Project emissions comprise less than 0.01 percent of the CO and ROG burdens, 0.09 percent of the NO_x burden, 0.14 percent of the SO_x burden, and 0.03 percent of the PM_{10} burden. Thus, regional air quality impacts would be small. Also local air quality impacts would not be significant, because construction emissions would be spread over a large area, and dispersion conditions are good during the daytime hours. Thus, pollutant concentrations at the base boundary and beyond should be relatively low and should not produce any new or additional violations of air quality standards (Table 3.7-1). Also, the emissions would cease after the construction work is completed.

Table 4.7.10-1
Typical Daily Construction Emission
(Vehicle Exhaust and Fugitive Dust) from Alternative 2A
(pounds per day)

Source	CO	ROG	NO_x	SO_x	PM_{10}
Material Delivery Trucks	22.70	2.70	13.64	—	1.39
Construction Worker Vehicles	42.16	2.15	6.61	—	1.74
Scrapers	70.39	23.80	215.04	24.25	22.74
Bulldozers	57.44	3.49	20.30	1.44	2.18
Other Construction Equipment (1)	23.56	7.30	103.55	7.20	3.64
Soil Disturbance	—	—	—	—	188.37
Total	**216.25**	**39.44**	**359.14**	**32.89**	**220.06**

(1)Compactors, Backhoe/Trencher, Front-end Loader, Mobile Crane, Pile Driver, Portable Generator, Water Trucks, and onbase Dump Truck.

4.7.10.2 Operation Impacts

Since the stormwater management system is the same for this alternative as for Alternative 1A, the air quality impacts would be the same, i.e. not significant (Section 4.7.7.2).

4.7.11 Alternative 2B [Levee Alignment 2 + Bridge Alignment B]

4.7.11.1 Construction Impacts

This alternative would be similar to Alternative 2A, except it would require 56 more trips to deliver material for bridge construction. Over the two-year construction period, this equates to an additional truck delivery about once every six days. This would result in slightly higher emissions for this alternative than for Alternative 2A. However, for practical purposes the emissions for Alternative 2B would be the same as those from Alternative 3A. Thus, the air quality impacts would be the same, i.e. not significant (Section 4.7.10.1).

4.7.11.2 Operation Impacts

Since the stormwater management system is the same for this alternative as for Alternative 1A, the air quality impacts would be the same, i.e. not significant (Section 4.7.7.2).

4.7.12 Alternative 2C [Levee Alignment 2 + Bridge Alignment C]

4.7.12.1 Construction Impacts

The emission estimates for this alternative are for both the Flood Control Project (P-010) and the Basilone Road Bridge Replacement Project (P-030). From the construction requirements for this alternative described in Section 2.3.9.3, the following assumptions were made for the emission calculations:

- 41 material truck delivery trips per day from Oceanside (round trip-40 miles)
- 3 trips per day by onbase dump trucks from the Chappo (22) Area borrow site (round trip-12 miles)
- 8 scrapers, 8 hours/day
- 2 bulldozers, 8 hours/day
- 20 other pieces of construction equipment, 8 hours/day
- 150 construction worker vehicles traveling 50 miles per day
- 3,310 tons of soil excavated, dumped, and placed each day
- 14.0 acres disturbed each day

The results of the construction emission calculations are presented in Table 4.7.12-1.

Emissions from the two proposed projects, when compared with the daily emissions in the San Diego air basin (Table 4.7.4-2), would be quite small. Project emissions comprise less than 0.01 percent of the CO and ROG burdens, 0.10 percent of the NO_x burden, 0.16 percent of the SO_x burden, and 0.04 percent of the PM_{10} burden. Thus, regional air quality impacts would be small. Also local air quality impacts would not be significant, because construction emissions would be spread over a large area, and dispersion conditions are good during the daytime hours. Thus, pollutant concentrations at the base boundary and beyond should be relatively low and should not produce any new or additional violations of air quality standards (Table 3.7-1). Also, the emissions would cease after the construction work is completed.

Table 4.7.12-1
Typical Daily Construction Emission
(Vehicle Exhaust and Fugitive Dust) from Alternative 2C
(pounds per day)

Source	CO	ROG	NO_x	SO_x	PM_{10}
Material Delivery Trucks	27.37	3.26	16.45	—	1.68
Construction Worker Vehicles	42.16	2.15	6.61	—	1.74
Scrapers	80.45	27.20	245.76	27.71	25.99
Bulldozers	57.44	3.49	20.30	1.44	2.18
Other Construction Equipment [(1)]	23.73	7.32	103.63	7.20	3.65
Soil Disturbance	—	—	—	—	214.59
Total	**231.15**	**43.42**	**392.75**	**36.35**	**249.83**

[(1)]Compactors, Backhoe/Trencher, Front-end Loader, Mobile Crane, Pile Driver, Portable Generator, Water Trucks, and onbase Dump Truck.

4.7.12.2 Operation Impacts

Since the stormwater management system is the same for this alternative as for Alternative 1A, the air quality impacts would be the same, i.e. not significant (Section 4.7.7.2).

4.7.13 General Conformity Applicability

The EPA published the General Conformity Rule in the Federal Register on November 15, 1993. The EPA's general conformity rules apply primarily in areas of the county designated as "Nonattainment" for air quality purposes. The Clean Air Act (CAA), Section 176(c)(1) requires that all Federal actions conform to the State Implementation Plan (SIP). Any proposed action shall not:

- Cause or contribute to any new violation of any National Ambient Air Quality Standard (NAAQS) in any area;
- Increase the frequency or severity of any existing violation of any area; or
- Delay timely attainment of any required interim mission reduction or other milestone in any area.

In nonattainment and maintenance areas, conformity determinations are required for nearly all Federal and Federally-assisted actions having the potential to result in direct or indirect emissions equal to or exceeding the threshold emissions rates listed in Table 4.7.13-1 (for nonattainment areas).

If the total direct and indirect emissions from a proposed Federal action, after subtracting any exempted emissions or emissions that are presumed to conform, for a peak year of activity would not exceed the threshold annual emission rates for criteria pollutants, the Federal action would be deemed *de minimis* and exempted from the conformity requirements. However, before a proposed project can be declared de minimis and exempted from further conformity analyses/determination requirements, the project's estimated emissions of each pollutant of concern cannot equal or exceed 10 percent of the air quality control region's emission inventory for that type of pollutant. If the project's estimated emissions would equal or exceed the 10 percent amount, the project would be deemed a "regionally significant action", and would not qualify for an exemption. The proposed project must then undergo a complete conformity analysis.

Table 4.7.13-1
De Minimis Thresholds in Nonattainment Areas

Criteria Pollutant	Degree of Nonattainment	Tons/year
Ozone (VOCs and No_x)	Serious	50
	Severe	25
	Extreme	10
	Other ozone nonattainment areas (outside of ozone transport region)	100
VOCs	Marginal/moderate nonattainment (within ozone transport region)	50
NO_x	Marginal/moderate nonattainment (within ozone transport region)	100
Carbon monoxide	All	100
Particulate matter (PM_{10})	Moderate	100
	Serious	70
Sulfur/nitrogen dioxide (SO_2/NO_2)	All	100
Lead (Pb)	All	25

The project emissions (tons per year) for each alternative are presented in Table 4.3.13-2. The only pollutants for which San Diego County exceeds the NAAQS are O_3.and CO. The county is classified as serious nonattainment for O_3 and moderate nonattainment for CO. Ozone is formed in the atmosphere by the reaction of VOCs, referred to as reactive organic gases (ROG), and NO_x. These are known as the precursor air pollutants for emissions analysis. As shown in Table 4.7.13-1, the threshold limit for VOCs (ROG) and NO_x is 50 tons per year. As shown in Table 4.7.13-2, ROG and NO_x emissions for the combined projects (P-010 and P-030) under all alternatives would be less than 50 tons per year. The threshold value for CO is 100 tons per year. The CO emissions from the combined projects are well below this threshold for all alternatives (Table 4.7.13-2). Also, the construction emissions, as discussed for each alternative, would comprise less than one percent of the San Diego air basin emissions. Thus, the construction portions of the projects are exempted from general conformity requirements. A Record of Non-Applicability (RONA) is included in Appendix F.

Table 4.7.13-2
Annual Construction Emissions for Each Project Alternative
(tons per year)

Alternative	CO	ROG	NO_x	SO_x	PM_{10}
3A	19.45	3.54	32.32	2.96	18.75
3B	19.45	3.54	32.32	2.96	18.75
3C	21.02	3.93	35.48	3.26	21.44
1A	24.33	4.37	39.05	3.65	24.22
1B	24.33	4.37	39.05	3.65	24.22
1C	24.75	4.42	39.30	3.65	26.61
2A	19.45	3.54	32.32	2.96	19.82
2B	19.45	3.54	32.32	2.96	19.82
2C	20.80	3.90	35.34	3.27	22.49

The operation of the stormwater management system pumps would be exempted from the general conformity requirements. This is due to the fact that the conformity rule exempts emissions from permitted sources, and also provides exemptions for emissions that occur during emergency situations (flooding).

4.7.14 No Action Alternative

Under the No Action Alternative the two proposed projects (P-010 and P-030) would not be constructed, and the construction and operation impacts to air quality would not occur. The existing levee and temporary bridge at Basilone Road would not result in any significant air quality impacts beyond those occurring under the existing conditions.

4.7.15 Mitigation Measures

Since none of the proposed alternatives would result in significant air quality impacts, no mitigation measures other than watering would be required.

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4.8 CULTURAL RESOURCES

Section 106 of the National Historic Preservation Act (NHPA) (16 USC 470), as amended (P.L. 89-515), and its implementing regulations (36 CFR Part 800), require federal agencies to consider the effects of their actions on properties listed, or eligible for listing, to the National Register of Historic Places (NRHP). Criteria for inclusion in the NRHP (36 CFR 60.4) are as follows:

A) Association with events that have made a significant contribution to the broad patterns of our history;

B) Association with the lives of persons significant to our past;

C) Resources that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D) Resources that have yielded or may be likely to yield information important in prehistory or history.

In addition to historic significance, a property must have integrity to be eligible to the NRHP. Integrity is the property's ability to convey its demonstrated historical significance. Seven individual elements comprise integrity: location, design, setting, materials, workmanship, feeling, and association.

The Criteria of Effect (36 CFR 800.9) of Section 106 of the NHPA state that "an undertaking has an effect on a historic property when that undertaking may alter those characteristics of the property that qualify the property for inclusion in the National Register." An undertaking is considered to have an adverse effect on a historic property when it may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects include, but are not limited to:

- Physical destruction, damage, or alteration of all or part of the property;
- Isolation of the property or alteration of the character of the property's setting when that character contributes to the property's qualifications for the NRHP;
- Introduction of visual, audible, or atmospheric elements that are out of character with the property, or changes that may alter its setting;

- Neglect of a property resulting in its deterioration or destruction; and

- Transfer, lease, or sale of a property, without adequate provisions to protect the property's historic integrity.

In addition to the Criteria of Effect as defined by 36 CFR 800.9, other types of disturbance may occur that would be of concern to Native American groups. Such concerns may include inadvertent discovery of Native American remains and objects (provisions for notification and consultation identified under the Native American Graves Protection and Repatriation Act Section 3[d]).

4.8.1 Criteria for Determination of Significant Impacts

The assessment of impacts to prehistoric and historic resources is based on the type of site, eligibility status, the type of impact, and the extent of disturbance from the project. Impacts to prehistoric and historic resources are considered significant if the project could adversely affect those sites eligible for the National Register of Historic Places (NRHP).

The assessment of impacts to traditional cultural properties is based on the type of resource, the type of impact and the extent of disturbance from the project. Impacts to traditional cultural properties are considered significant if the project has the potential to disturb Native Americans remains, or to affect NRHP-eligible resources of value to Native Americans (National Park Service, 1991; Parker and King, 1990).

4.8.2 Impact Analysis

Project-related effects to cultural resources consist of both direct and indirect impacts. Direct impacts are those that would occur during project construction, removal of the existing levee, project development, and operation that would directly impinge on, or destroy cultural resources, such as all activities that entail earthmoving or those that would inundate sites. Impacts can occur directly to the site by loss of all or part of the site through grading, filling, or other construction. Ground disturbing activities affect the physical integrity of cultural resources, destroying their research potential and subsequently, their eligibility for the National Register of Historic Places. Impacts to the site can include such things as flooding due to diversion of streams, or rivers as well as changes in chemical constituents of the soil that can alter the preservation of materials such as bone, shell, and wood. Chemical changes also can affect the ability to conduct radiocarbon analysis and other dating techniques. Impacts can occur indirectly through the alteration of the character of the site setting, and the introduction of visual, audible, or atmospheric elements that change the character of the site or its setting. Changes in site setting may include removal of vegetation or construction of structures, buildings, or roads adjacent to the site. Vibration from heavy construction equipment

working in areas adjacent to historic adobe buildings may also disturb or destroy the physical integrity of structural elements.

Although the construction phase of the proposed project is of a relatively short duration, impacts to NRHP-eligible and NRHP-listed cultural resources will be long-term and permanent. Potential short term construction-related impacts include introduced vibration to historic structures.

4.8.2.1 Alternative 3A [Levee Alignment 3 + Bridge Alignment A] - Preferred Alternative

Potential Impacts. Portions of three NRHP-eligible cultural resources would be impacted by project activities associated with Alternative 3A (Tables 4.8.2-1 and 4.8.2-2). Additional buried NRHP-eligible sites may occur in the river basin and may be identified during construction. Native American remains may be disturbed at site CA-SDI-10156/12599/H. Because NRHP-eligible sites would be affected and Native American remains could be disturbed, impacts to cultural resources would be significant.

Levee Alignment 3. Impacts to cultural resources from the proposed Levee Alignment 3 would include ground disturbance and vibration associated with the construction of the levee; road construction along Vandegrift Boulevard; use of access roads and establishment of construction staging areas; and excavation of construction materials from onbase sources.

Three NRHP-eligible cultural resources would be impacted by the proposed Levee Alignment 3. Levee construction would impact about 26 percent of CA-SDI-10156/12599/H (Luiseño village and Santa Margarita Ranch House complex), 38 percent of CA-SDI-12628 (prehistoric shell midden), and 13 percent of Segment A of CA-SDI-14005-H (historic railroad). Construction of Levee Alignment 3 would result in the partial loss of these three NRHP-eligible sites (Table 4.8.2-3).

Less than one percent of Segment B of CA-SDI-14005-H occurs within the proposed levee construction area near the Santa Margarita Ranch House complex. Levee construction in this area consists of fill and would serve as a protective cap to preserve in place any remains of this segment. Therefore, no significant impacts are anticipated to Segment B of CA-SDI-14005-H.

Based on the presence of buried deposits in adjacent areas, additional cultural resources in the alluvial deposits in the river basin may also be identified during construction activities (Gallegos & Associates 1997a). Some of these buried resources are likely to be considered NRHP-eligible.

Site CA-SDI-10156/12599/H may also contain Native American remains, which could be disturbed during levee construction.

Table 4.8.2-1

Summary of Cultural Resources Impacted by Alternatives 3A - 3C

3A	3B	3C
Levee Alignment 3: ■ Three NRHP-eligible sites CA-SDI-10156/12599/H (26% disturbed) CA-SDI-12628 (38% disturbed) Segment A of CA-SDI-14005-H (13% disturbed) ■ Additional buried NRHP-eligible sites in the river basin ■ Native American remains at CA-SDI-10156/12599/H	**Levee Alignment 3:** ■ Same as Alternative 3A	**Levee Alignment 3:** ■ Same as Alternative 3A
Bridge Alignment A: ■ One NRHP-eligible site, CA-SDI-10156/12599/H (10% disturbed) ■ Additional buried NRHP-eligible sites in the river basin ■ Native American remains at CA-SDI-10156/12599/H	**Bridge Alignment B:** ■ One NRHP-eligible site, CA-SDI-10156/12599/H (29% disturbed) ■ Additional buried NRHP-eligible sites in the river basin ■ Native American remains at CA-SDI-10156/12599/H	**Bridge Alignment C:** ■ One NRHP-eligible site CA-SDI-13986 (22% disturbed) ■ Additional buried NRHP-eligible sites in the river basin
Summary: ■ Three NRHP-eligible sites CA-SDI-10156/12599/H (36% disturbed) CA-SDI-12628 (38% disturbed) Segment A of CA-SDI-14005-H (13% disturbed) ■ Additional buried NRHP-eligible sites in the river basin ■ Native American remains at CA-SDI-10156/12599/H	**Summary:** ■ Three NRHP-eligible sites CA-SDI-10156/12599/H (55% disturbed) CA-SDI-12628 (38% disturbed) Segment A of CA-SDI-14005-H (13% disturbed) ■ Additional buried NRHP-eligible sites in the river basin ■ Native American remains at CA-SDI-10156/12599/H	**Summary:** ■ Four NRHP-eligible sites CA-SDI-10156/12599/H (26% disturbed) CA-SDI-12628 (38% disturbed) Segment A of CA-SDI-14005-H (13% disturbed) CA-SDI-13986 (22% disturbed) ■ Additional buried NRHP-eligible sites in the river basin ■ Native American remains at CA-SDI-10156/12599/H

Table 4.8.2-2

Estimated Percentage of Disturbance to Known NRHP-Eligible Sites by Alternative

	Sites			
Alternative	**CA-SDI-10156/12599/H**	**CA-SDI-12628**	**CA-SDI-14005-H Segment A**	**CA-SDI-13986**
3A	36	38	13	0
3B	55	38	13	0
3C	26	38	13	22
1A	37	10	<1	100
1B	56	10	<1	100
1C	27	10	<1	100
2A	26	30	6	0
2B	45	30	6	0
2C	16	30	6	22

Table 4.8.2-3

Estimated Disturbances to Known NRHP-Eligible Sites by Project Component

Project Component	Site Number	Site Size	Approximate Project Disturbance	Approximate Percentage Disturbed
Levee Alignment 3				
	CA-SDI-10156/12599/H	85,020 square meters	22,300 square meters	26
	CA-SDI-12628	56,250 square meters	21,600 square meters	38
	CA-SDI-14005-H			
	Segment A	7.5 miles	.99 miles	13
	Segment B*	10.3 miles	.05 miles	<1
Levee Alignment 1				
	CA-SDI-10156/12599/H	85,020 square meters	23,200 square meters	27
	CA-SDI-12628	56,250 square meters	5,800 square meters	10
	CA-SDI-14005-H			
	Segment A	7.5 miles	.07 miles	<1
	Segment B*	10.3 miles	.04 miles	<1
	CA-SDI-13986	26,600 square meters	26,600 square meters	100
Levee Alignment 2				
	CA-SDI-10156/12599/H	85,020 square meters	13,900 square meters	16
	CA-SDI-12628	56,250 square meters	17,400 square meters	30
	CA-SDI-14005-H			
	Segment A	7.5 miles	.50 miles	6
	Segment B*	10.3 miles	.08 miles	<1
Bridge Alignment A				
	CA-SDI-10156/12599/H	85,020 square meters	8,710 square meters	10
Bridge Alignment B				
	CA-SDI-10156/12599/H	85,020 square meters	24,400 square meters	29
Bridge Alignment C				
	CA-SDI-14005-H			
	Segment B*	10.3 miles	.02 miles	<1
	CA-SDI-13986	26,600 square meters	5,950 square meters	22

Note: * No physical remains

Stormwater Management System. Impacts to cultural resources from the proposed stormwater management system would include ground disturbance associated with the construction of the pump station; and use and establishment of construction staging areas.

One NRHP-eligible cultural resource, a prehistoric shell midden (CA-SDI-12628), would be impacted by the construction of the proposed pump station resulting in a partial loss of the site (included in the 38 percent disturbed under levee construction). Based on the presence of buried deposits in adjacent areas, additional cultural resources buried in the alluvial deposits along the riverbank may also be identified during construction activities (Gallegos & Associates 1997a). Some of these buried resources are likely to be considered NRHP-eligible.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. Impacts to cultural resources from the proposed Basilone Road bridge replacement would include ground disturbance associated with the construction of the bridge and road; use and establishment of construction staging areas; and excavation of construction materials from onbase sources.

One NRHP-eligible multicomponent site, the Luiseño village and Santa Margarita Ranch House complex (CA-SDI-10156/12599/H), would be impacted by the construction of Basilone Road resulting in an additional loss of 13 percent of the site (Table 4.8.2-3). Based on the presence of buried deposits in adjacent areas, additional cultural resources buried in the alluvial deposits in the river basin may also be identified during construction activities (Gallegos & Associates 1997a). Some of these buried resources are likely to be considered NRHP-eligible.

Site CA-SDI-10156/12599/H may also contain Native American remains, which could be disturbed during bridge construction.

Mitigation Measures. Because NRHP-eligible sites cannot be avoided through project design or siting, the proposed project would result in an adverse impact to cultural resources resulting in a significant impact under NEPA (Table 4.8.2-4). A Memorandum of Agreement (MOA) is being coordinated among the Department of the Navy, U.S. Marine Corps, the California State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (ACHP). The appropriate level of data recovery for mitigation will be determined through consultation with the California SHPO and the ACHP, in accordance with Section 106 of the National Historic Preservation Act. A data recovery and treatment plan, and a construction monitoring and discovery plan are being prepared and will be stipulated in the MOA.

Because Native American remains may occur on Site CA-SDI-10156/12599/H, acceptable mitigations to lessen the impact on these resources will be determined in consultation with the appropriate Native American groups and incorporated into

Table 4.8.2-4

Recommendations for Known NRHP-Eligible Sites in the APE

Resource	Alternative	Effect	Recommendation
CA-SDI-10156/12599/H	3A, 3B, 3C 1A, 1B, 1C 2A, 2B, 2C	Direct	Data Recovery, Monitoring
CA-SDI-12628	3A, 3B, 3C 1A, 1B, 1C 2A, 2B, 2C	Direct	Data Recovery, Monitoring
CA-SDI-14005-H, Segment A	3A, 3B, 3C 1A, 1B, 1C 2A, 2B, 2C	Direct	Mitigation Previously Conducted for Project 527B
CA-SDI-13986	3C, 1A, 1B, 1C, 2C	Direct	Data Recovery, Monitoring

the data recovery and treatment plan. Inadvertent discovery of additional human remains and associated artifacts may also occur during project construction. According to provisions in the Native American Graves Protection and Repatriation Act Section 3(d):

> (1) Any person who knows, or has reason to know, that such person has discovered Native American cultural items on Federal or tribal lands after the date of enactment of this Act shall notify, in writing, the Secretary of the Department, or head of any other agency or instrumentality of the United States, having primary management authority with respect to Federal lands, and the appropriate Indian tribe with respect to tribal lands, if known or readily ascertainable.
>
> If the discovery occurred in connection with an activity, including construction, the person shall cease the activity in the area of the discovery, make a reasonable effort to protect the items discovered before resuming such activity, and provide notice under this subsection.
>
> Following the notification under this subsection, and upon certification by the Secretary of the department or the head of any agency or instrumentality of the United States or the appropriate Indian tribe that notification has been received, the activity may resume after 30 days of such certification.

(2) The disposition of and control over any cultural items excavated or removed under this subsection shall be determined as provided for in this section [Section 3].

Appropriate procedures in accordance with NAGPRA will be defined and specific responsibilities will be identified in the construction monitoring and discovery plan.

4.8.2.2 Alternative 3B [Levee Alignment 3 + Bridge Alignment B]

Potential Impacts. The same three NRHP-eligible sites and other cultural resources identified in Alternative 3A would be impacted by project activities associated with Alternative 3B (Tables 4.8.2-1 and 4.8.2-2). However, different percentages of NRHP-eligible sites would be affected. Because NRHP-eligible sites would be affected and Native American remains could be disturbed, impacts to cultural resources under Alternative B would be significant.

Levee Alignment 3. Impacts to cultural resources as a result of project activities associated with Levee Alignment 3 have been previously discussed under Alternative 3A and are the same.

Stormwater Management System. Impacts to cultural resources as a result of project activities associated with the stormwater management system have been previously discussed under Alternative 3A and are the same.

Bridge Alignment B - East Curve Alignment. Impacts to cultural resources from the proposed East Curve Alignment would include ground disturbance associated with the construction of the bridge and road; use and establishment of construction staging areas; and excavation of construction materials from onbase sources.

One NRHP-eligible multicomponent site, the Luiseño village and Santa Margarita Ranch House complex (CA-SDI-10156/12599/H), would be impacted by the construction of Basilone Road resulting in an additional loss of 29 percent of the site. Based on the presence of buried deposits in adjacent areas, additional cultural resources buried in the alluvial deposits in the river basin may also be identified during construction activities (Gallegos & Associates 1997a). Some of these buried resources are likely to be considered NRHP-eligible.

Site CA-SDI-10156/12599/H may also contain Native American remains, which could be disturbed during bridge construction.

Mitigation Measures. Mitigation measures are the same as discussed under Alternative 3A.

4.8.2.3 Alternative 3C [Levee Alignment 3 + Bridge Alignment C]

Potential Impacts. In addition to the cultural resources identified in Alternative 3A, a fourth NRHP-eligible site would be impacted by project activities associated with Alternative 3C (Tables 4.8.2-1 and 4.8.2-2). Different percentages of NRHP-eligible sites would be affected. Because NRHP-eligible sites would be affected and Native American remains could be disturbed, impacts to cultural resources under Alternative 3C would be significant.

Levee Alignment 3. Impacts to cultural resources as a result of project activities associated with Levee Alignment 3 have been previously discussed under Alternative 3A and are the same.

Stormwater Management System. Impacts to cultural resources as a result of project activities associated with the stormwater management system have been previously discussed under Alternative 3A and are the same.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Ground disturbing activities from the proposed Rattlesnake Canyon Road Alignment would adversely affect two NRHP-eligible cultural resources. Road construction would impact about 22 percent of site CA-SDI-13986 (a village site). Construction of Bridge Alignment C would result in the partial loss of this NRHP-eligible site. Less than one percent of Segment B of CA-SDI-14005-H occurs within the proposed bridge construction area near the Santa Margarita Ranch House complex. Bridge construction in this area consists of fill and would serve as a protective cap to preserve in place any remains of this segment. Therefore, no significant impacts are anticipated to Segment B of CA-SDI-14005-H. Based on the presence of buried deposits in adjacent areas, additional cultural resources buried in the alluvial deposits in the river basin may also be identified during construction activities (Gallegos & Associates 1997a). Some of these buried resources are likely to be considered NRHP-eligible.

Mitigation Measures. Mitigation measures are the same as discussed under Alternative 3A.

4.8.2.4 Alternative 1A [Levee Alignment 1 + Bridge Alignment A]

Potential Impacts. Four NRHP-eligible cultural resources would be impacted by project activities associated with Alternative 1A (Tables 4.8.2-5 and 4.8.2-2). Additional buried NRHP-eligible sites may occur in the river basin and may be identified during construction. Native American remains may be disturbed at site CA-SDI-10156/12599/H. Because NRHP-eligible sites would be affected and Native American remains could be disturbed, impacts to cultural resources would be significant.

Table 4.8.2-5

Summary of Cultural Resources Impacted by Alternatives 1A - 1C

1A	1B	1C
Levee Alignment 1: ■ Four NRHP-eligible sites CA-SDI-10156/12599/H (27% disturbed) CA-SDI-12628 (10% disturbed) Segment A of CA-SDI-14005-H (<1% disturbed) CA-SDI-13986 (100% destroyed) ■ Additional buried NRHP-eligible sites in the river basin ■ Native American remains at CA-SDI-10156/12599/H	**Levee Alignment 1:** ■ Same as Alternative 1A	**Levee Alignment 1:** ■ Same as Alternative 1A
Bridge Alignment A: ■ One NRHP-eligible site, CA-SDI-10156/12599/H (10% disturbed) ■ Additional buried NRHP-eligible sites in the river basin ■ Native American remains at CA-SDI-10156/12599/H	**Bridge Alignment B** ■ One NRHP-eligible site, CA-SDI-10156/12599/H (29% disturbed) ■ Additional buried NRHP-eligible sites in the river basin ■ Native American remains at CA-SDI-10156/12599/H	**Bridge Alignment C:** ■ One NRHP-eligible site CA-SDI-13986 (22% disturbed) ■ Additional buried NRHP-eligible sites in the river basin
Summary: ■ Four NRHP-eligible sites CA-SDI-10156/12599/H (37% disturbed) CA-SDI-12628 (10% disturbed) Segment A of CA-SDI-14005-H (<1% disturbed) CA-SDI-13986 (100% destroyed) ■ Additional buried NRHP-eligible sites in the river basin ■ Native American remains at CA-SDI-10156/12599/H	**Summary:** ■ Four NRHP-eligible sites CA-SDI-10156/12599/H (56% disturbed) CA-SDI-12628 (10% disturbed) Segment A of CA-SDI-14005-H (<1% disturbed) CA-SDI-13986 (100% destroyed) ■ Additional buried NRHP-eligible sites in the river basin ■ Native American remains at CA-SDI-10156/12599/H	**Summary:** ■ Four NRHP-eligible sites CA-SDI-10156/12599/H (27% disturbed) CA-SDI-12628 (10% disturbed) Segment A of CA-SDI-14005-H (<1% disturbed) CA-SDI-13986 (100% destroyed) ■ Additional buried NRHP-eligible sites in the river basin ■ Native American remains at CA-SDI-10156/12599/H

Levee Alignment 1. Impacts to cultural resources from the proposed Levee Alignment 1 would include ground disturbance and vibration associated with the construction of the levee, spur dikes and silt fences; grading of the bluff on the north side of the river; road construction along Vandegrift Boulevard; use of access roads and establishment of construction staging areas; excavation of construction materials from onbase sources; and water erosion as a result of rechannelization of the river.

Four NRHP-eligible cultural resources would be impacted by the proposed Levee Alignment 1. Site CA-SDI-13986, a prehistoric habitation site, would be completely destroyed through grading on the north side of the river. Levee construction would impact about 27 percent of CA-SDI-10156/12599/H (Luiseño village and Santa Margarita Ranch House complex), 10 percent of CA-SDI-12628 (prehistoric shell midden), and less than 1 percent of Segment A of CA-SDI-14005-H (historic railroad) (Table 4.8.2-3). Construction of Levee Alignment 1 would result in the partial loss of three NRHP-eligible sites and the complete loss of one NRHP-eligible site. Less than one percent of Segment B of CA-SDI-14005-H occurs within the proposed levee construction area near the Santa Margarita Ranch House complex. Levee construction in this area consists of fill and would serve as a protective cap to preserve in place any remains of this segment. Therefore, no significant impacts are anticipated to Segment B of CA-SDI-14005-H. Based on the presence of buried deposits in adjacent areas, additional cultural resources in the alluvial deposits in the river basin may also be identified during construction activities (Gallegos & Associates 1997a). Some of these buried resources are likely to be considered NRHP-eligible.

Site CA-SDI-10156/12599/H may also contain Native American remains, which could be disturbed during levee construction.

Stormwater Management System. Impacts to cultural resources from the proposed stormwater management system would include ground disturbance associated with the construction of the pump station; and use and establishment of construction staging areas.

One NRHP-eligible cultural resource, a prehistoric shell midden (CA-SDI-12628), would be impacted by the construction of the proposed pump station resulting in a partial loss of the site (included in the 10 percent disturbed under levee construction). Based on the presence of buried deposits in adjacent areas, additional cultural resources buried in the alluvial deposits along the riverbank may also be identified during construction activities (Gallegos & Associates 1997a). Some of these buried resources are likely to be considered NRHP-eligible.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. Impacts to cultural resources as a result of project activities associated with Bridge Alignment A have been previously discussed under Alternative 3A and are the same.

Mitigation Measures. Mitigation measures are the same as discussed under Alternative 3A.

4.8.2.5 Alternative 1B [Levee Alignment 1 + Bridge Alignment B]

Potential Impacts. The same four NRHP-eligible sites and other cultural resources identified in Alternative 1A would be impacted by project activities associated with Alternative 1B (Tables 4.8.2-5 and 4.8.2-2). However, different percentages of NRHP-eligible sites would be affected. Because NRHP-eligible sites would be affected and Native American remains could be disturbed, impacts to cultural resources under Alternative 1B would be significant.

Levee Alignment 1. Impacts to cultural resources as a result of project activities associated with Levee Alignment 1 have been previously discussed under Alternative 1A and are the same.

Stormwater Management System. Impacts to cultural resources as a result of project activities associated with the stormwater management system have been previously discussed under Alternative 1A and are the same.

Bridge Alignment B - East Curve Alignment. Impacts to cultural resources as a result of project activities associated with Bridge Alignment B have been previously discussed under Alternative 3B and are the same.

Mitigation Measures. Mitigation measures are the same as discussed under Alternative 3A.

4.8.2.6 Alternative 1C [Levee Alignment 1 + Bridge Alignment C]

Potential Impacts. The same four NRHP-eligible sites and other cultural resources identified in Alternative 1A would be impacted by project activities associated with Alternative 1C (Tables 4.8.2-5 and 4.8.2-2). Different percentages of NRHP-eligible sites would be affected. Because NRHP-eligible sites would be affected and Native American remains could be disturbed, impacts to cultural resources under Alternative 1C would be significant.

Levee Alignment 1. Impacts to cultural resources as a result of project activities associated with Levee Alignment 1 have been previously discussed under Alternative 1A and are the same.

Stormwater Management System. Impacts to cultural resources as a result of project activities associated with the stormwater management system have been previously discussed under Alternative 1A and are the same.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Impacts to cultural resources as a result of project activities associated with Bridge Alignment C have been previously discussed under Alternative 3C and are the same.

Mitigation Measures. Mitigation measures are the same as discussed under Alternative 3A.

4.8.2.7 Alternative 2A [Levee Alignment 2 + Bridge Alignment A]

Potential Impacts. Portions of three NRHP-eligible cultural resources would be impacted by project activities associated with Alternative 2A (Tables 4.8.2-6 and 4.8.2-2). Additional buried NRHP-eligible sites may occur in the river basin and may be identified during construction. Native American remains may be disturbed at site CA-SDI-10156/12599/H. Because NRHP-eligible sites would be affected and Native American remains could be disturbed, impacts to cultural resources would be significant.

Levee Alignment 2. Impacts to cultural resources from the proposed Levee Alignment 2 would include ground disturbance and vibration associated with the construction of the levee, spur dikes and silt fences; road construction along Vandegrift Boulevard; use of access roads and establishment of construction staging areas; excavation of construction materials from onbase sources; and water erosion as a result of rechannelization of the river.

Levee construction would impact about 16 percent of CA-SDI-10156/12599/H, 30 percent of CA-SDI-12628, and 6 percent of Segment A of CA-SDI-14005-H. Construction of Levee Alignment 2 would result in the partial loss of these three NRHP-eligible sites (Table 4.8.2-3). Less than one percent of Segment B of CA-SDI-14005-H occurs within the proposed levee construction area near the Santa Margarita Ranch House complex. Levee construction in this area consists of fill and would serve as a protective cap to preserve in place any remains of this segment. Therefore, no significant impacts are anticipated to Segment B of CA-SDI-14005-H. Based on the presence of buried deposits in adjacent areas, additional cultural resources buried in the alluvial deposits in the river basin may also be identified during construction activities (Gallegos & Associates, 1997a). Some of these buried resources are likely to be considered NRHP-eligible.

Site CA-SDI-10156/12599/H may also contain Native American remains, which could be disturbed during levee construction.

Table 4.8.2-6

Summary of Cultural Resources Impacted by Alternatives 2A - 2C

2A	2B	2C
Levee Alignment 2: ▪ Three NRHP-eligible sites CA-SDI-10156/12599/H (16% disturbed) CA-SDI-12628 (30% disturbed) Segment A of CA-SDI-14005-H (6% disturbed) ▪ Additional buried NRHP-eligible sites in the river basin ▪ Native American remains at CA-SDI-10156/12599/H	**Levee Alignment 2:** ▪ Same as Alternative 2A	**Levee Alignment 2:** ▪ Same as Alternative 2A
Bridge Alignment A: ▪ One NRHP-eligible site, CA-SDI-10156/12599/H (10% disturbed) ▪ Additional buried NRHP-eligible sites in the river basin ▪ Native American remains at CA-SDI-10156/12599/H	**Bridge Alignment B:** ▪ One NRHP-eligible site, CA-SDI-10156/12599/H (29% disturbed) ▪ Additional buried NRHP-eligible sites in the river basin ▪ Native American remains at CA-SDI-10156/12599/H	**Bridge Alignment C:** ▪ One NRHP-eligible site CA-SDI-13986 (22% disturbed) ▪ Additional buried NRHP-eligible sites in the river basin
Summary: ▪ Three NRHP-eligible sites CA-SDI-10156/12599/H (26% disturbed) CA-SDI-12628 (30% disturbed) Segment A of CA-SDI-14005-H (6% disturbed) ▪ Additional buried NRHP-eligible sites in the river basin ▪ Native American remains at CA-SDI-10156/12599/H	**Summary:** ▪ Three NRHP-eligible sites CA-SDI-10156/12599/H (45% disturbed) CA-SDI-12628 (30% disturbed) Segment A of CA-SDI-14005-H (6% disturbed) ▪ Additional buried NRHP-eligible sites in the river basin ▪ Native American remains at CA-SDI-10156/12599/H	**Summary:** ▪ Four NRHP-eligible sites CA-SDI-10156/12599/H (16% disturbed) CA-SDI-12628 (30% disturbed) Segment A of CA-SDI-14005-H (6% disturbed) CA-SDI-13986 (22% disturbed) ▪ Additional buried NRHP-eligible sites in the river basin ▪ Native American remains at CA-SDI-10156/12599/H

Stormwater Management System. Impacts to cultural resources from the proposed stormwater management system would include ground disturbance associated with the construction of the pump station; and use and establishment of construction staging areas.

One NRHP-eligible cultural resource, a prehistoric shell midden (CA-SDI-12628), would be impacted by the construction of the proposed pump station resulting in a partial loss of the site (included in the 30 percent disturbed under levee construction). Based on the presence of buried deposits in adjacent areas, additional cultural resources buried in the alluvial deposits along the riverbank may also be identified during construction activities (Gallegos & Associates, 1997a). Some of these buried resources are likely to be considered NRHP-eligible.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. Impacts to cultural resources as a result of project activities associated with Bridge Alignment A have been previously discussed under Alternative 3A and are the same.

Mitigation Measures. Mitigation measures are the same as discussed under Alternative 3A.

4.8.2.8 Alternative 2B [Levee Alignment 2 + Bridge Alignment B]

Potential Impacts. The same three NRHP-eligible sites and other cultural resources identified in Alternative 2A would be impacted by project activities associated with Alternative 2B (Tables 4.8.2-6 and 4.8.2-2). However, different percentages of NRHP-eligible sites would be affected. Because NRHP-eligible sites would be affected and Native American remains could be disturbed, impacts to cultural resources under Alternative 2B would be significant.

Levee Alignment 2. Impacts to cultural resources as a result of project activities associated with Levee Alignment 2 have been previously discussed under Alternative 2A are the same.

Stormwater Management System. Impacts to cultural resources as a result of project activities associated with the stormwater management system have been previously discussed under Alternative 2A are the same.

Bridge Alignment B - East Curve Alignment. Impacts to cultural resources as a result of project activities associated with Bridge Alignment B have been previously discussed under Alternative 3B are the same.

Mitigation Measures. Mitigation measures are the same as discussed under Alternative 3A.

4.8.2.9 Alternative 2C [Levee Alignment 2 + Bridge Alignment C]

Potential Impacts. In addition to the cultural resources identified in Alternative 2A, a fourth NRHP-eligible site would be impacted by project activities associated with Alternative 2C (Tables 4.8.2-6 and 4.8.2-2). Different percentages of NRHP-eligible sites would be affected. Because NRHP-eligible sites would be affected and Native American remains could be disturbed, impacts to cultural resources under Alternative 2C would be significant.

Levee Alignment 2. Impacts to cultural resources as a result of project activities associated with Levee Alignment 2 have been previously discussed under Alternative 2A and are the same.

Stormwater Management System. Impacts to cultural resources as a result of project activities associated with the stormwater management system have been previously discussed under Alternative 2A and are the same.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. Impacts to cultural resources as a result of project activities associated with Bridge Alignment C have been previously discussed under Alternative 3C and are the same.

Mitigation Measures. Mitigation measures are the same as discussed under Alternative 3A.

4.8.2.10 No Action Alternative

Impacts to cultural resources from the No Action Alternative would include ground disturbance resulting from natural processes such as water erosion. Continued flooding along the riverbed would disturb or destroy intact cultural resources. Impacts would be increased in areas where human activities accelerate the natural processes. Such activities may include repair of flood damaged roads and bridges, and stabilization of the riverbanks.

4.8.3 Analysis of Significance

Upon adoption and implementation of the MOA, all impacts to prehistoric and historic resources can be mitigated to below a level of significance through the data recovery techniques developed in consultation with and approved by the California State Historic Preservation Officer.

Impacts to Native American remains may be mitigated to below a level of significance through specific mitigations developed in accordance with the Native American Graves Protection and Repatriation Act, and in consultation with and approved by the Luiseño.

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4.9 AESTHETICS AND VISUAL RESOURCES

4.9.1 Criteria for Significance Determination

The visual quality of an area is based on its aesthetic character, which is defined by physical character and perceptual quality factors. Physical character factors are the physical elements of which a particular landscape unit is built. Landform is a physical character element described as the shape or mass of a geographic feature or physical structure, often defined by the edge or outline and the surrounding space. Alterations to landforms are considered significant if a substantial change to the mass of the landform would occur. Visual impacts are perceptual quality factors based on the viewer's perceptions of landscape quality. Visual impacts are considered significant if a proposed action would result in a substantial change to a sensitive viewshed or an area with sensitive receptors.

Impact determinations are based on visual sensitivity of a project area, as described in Section 3.9, and the visual dominance of the proposed change. A proposed project alternative would have a significant impact on the aesthetic or visual environment if it:

- Substantially contrasts with the character and scale of the existing community;
- Degrades views from any formally recognized scenic viewshed or roadway; or
- Dominates views of a visually unique structure or landform.

The construction sites proposed for each alternative are discussed below with respect to these criteria.

4.9.2 Impact Analysis

4.9.2.1 Alternative 3A [Levee Alignment 3 + Bridge Alignment A] - Preferred Alternative

Levee Alignment 3. The proposed flood control project would be constructed entirely within the boundaries of MCB Camp Pendleton. The flood control project would be constructed entirely within the Santa Margarita River Valley, which is surrounded by steeply sloping hillsides. Therefore, grading and construction activities would not be visible from offbase locations. The proposed levee would be constructed to a maximum height of 27 feet, a maximum length of approximately 15,400 feet, with a service road along the top. Levee slopes would be 1:1. The levee would be constructed of fill material with a rock face, which would include rip-rap and a "honeycomb" pattern concrete material.

Levee Alignment 3 would have a single guide vane which would extend from the main levee structure north of the Santa Margarita Ranch House complex. The guide vane would have a maximum height of 27 feet and a maximum length of 1,000 feet. The guide vane would have a slope of 1:1 and would be constructed of concrete material similar to the main levee structure. The levee would be a prominent structure of considerable mass, and would have a visible, sloping facade with the appearance of an artificial structure.

A segment of Levee Alignment 3 between MCAS Camp Pendleton and STP No. 3 along Vandegrift Boulevard would be constructed as a flood wall constructed of reinforced concrete, concrete cribbing, or reinforced earth with precast facing. The flood wall segment would have a length of approximately 2,000 feet and a maximum height of 16 feet. The flood wall would be visible to motorists along Vandegrift Boulevard and would remove existing views of riparian vegetation. The flood wall would not substantially contrast with the character of the surrounding developed facilities which include the airfield, buildings on MCAS Camp Pendleton and the Chappo (22) Area, and STP No. 3. The flood wall would not degrade views from a formally recognized scenic viewshed or roadway. Therefore, the flood wall would not result in a significant impact to visual resources.

MCAS Camp Pendleton consists of large buildings, concrete paved runways, and large military rotary-winged aircraft. The Chappo (22) Area includes numerous military buildings, warehouse, and equipment which have a military/industrial/ mechanical character. The flood control improvement would not substantially alter the visual character of the surrounding area as seen from the Chappo (24) Area and Vandegrift Boulevard. The flood control improvement would primarily be viewed by Base personnel, users of MCAS Camp Pendleton facilities, and authorized visitors. No significant impacts to visual resources would occur.

A borrow site at Chappo (22) Area is proposed to provide fill material to construct the flood control project, predominantly to construct the levee structure. The borrow site would be partially visible to Base personnel and visitors from limited portions of the east end of the Chappo (22) Area. The borrow site does not dominate views of a visually unique landform and is not located within sensitive viewsheds. An estimated 530,000 cubic yards of fill material would be required to construct the levee structure and spur dikes. The removal of 530,000 cubic yards of material would result in a significant alteration to landform. However, the borrow site is not located within sensitive viewsheds. The alteration in landform would not result in a significant impact to visual resources.

Stormwater Management System. The stormwater management system would consist of a pump station constructed in an enclosed building with below grade pipes. The pump station would be

constructed within a previously disturbed area adjacent to STP No. 3, and would not result in a substantial change to landform. The pump station would not substantially contrast with the character of the surrounding developed facilities, including STP No. 3 and buildings on the MCAS Camp Pendleton and Chappo (22) Area.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. The proposed Basilone Road Bridge Replacement would be located entirely within the limits of MCB Camp Pendleton, and would not be visible from offbase locations. The proposed Basilone Road Bridge would be constructed in the same general location as the existing bridge. Therefore, the proposed alignment would not result in a substantial change in the viewshed. Views of the proposed Basilone Road Bridge alignment would be visible from Vandegrift Boulevard, Basilone Road, MCAS Camp Pendleton, and the Santa Margarita Ranch House complex. This alignment would not result in significant impacts to aesthetics or visual resources.

4.9.2.2 Alternative 3B [Levee Alignment 3 + Bridge Alignment B]

Levee Alignment 3. Alternative 3B would include the same Levee Alignment 3 discussed in Alternative 3A. Levee Alignment 3 would not substantially alter the visual character of the surrounding area. No significant impacts to aesthetics and visual resources would occur.

Bridge Alignment B - East Curve Alignment. This alignment would replace the existing Basilone Road Bridge with a bridge which crosses the Santa Margarita River with an eastern curve. This would result in similar impacts to the viewshed as Alignment A. This alignment would be visible from Vandegrift Boulevard, Basilone Road, MCAS Camp Pendleton, and the Santa Margarita Ranch House complex. This alignment would not result in significant impacts to aesthetics or visual resources.

4.9.2.3 Alternative 3C [Levee Alignment 3 + Bridge Alignment C]

Levee Alignment 3. Alternative 3C includes the same Levee Alignment 3 discussed in Alternative 3A. Levee Alignment 3 would not substantially alter the visual character of the surrounding area. No significant impacts to aesthetics and visual resources would occur.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. This alignment would include a new bridge (2,000 feet in length), with roadway approaches which would span the riverbed and riparian woodland. This alignment would require considerable fill material (93,433 cubic yards) for roadway approaches to connect with Vandegrift Boulevard and Basilone Road and numerous foundation piers within the riverbed. This bridge would be visible from Basilone Road, Vandegrift Boulevard, the Vade del Rio (25) Area, and the Santa Margarita Ranch House complex.

The Rattlesnake Canyon Road Alignment would substantially contrast with the undeveloped character of the Santa Margarita River north of the historic Santa Margarita Ranch House complex. The Rattlesnake Canyon Road Alignment would be a prominent roadway structure with a raised elevation above the Santa Margarita River which would dominate views of the riverbed and riparian woodland within the Santa Margarita River and hillsides next to the Vade Del Rio (25) Area. This bridge alignment would result in significant impacts to visual resources. The regrowth or planting of riparian vegetation and woodland would screen the foundation piers within the riverbed to reduce the visual prominence of the roadway structure to the undeveloped Santa Margarita River. However, the regrowth or planting or riparian vegetation and woodland would not reduce the impact of a raised road bridge which contrasts with the surrounding visual character of the Santa Margarita River to a level less than significant.

4.9.2.4 Alternative 1A [Levee Alignment 1 + Bridge Alignment A]

Levee Alignment 1. The proposed flood control project would be constructed entirely within the Santa Margarita River Valley within the boundaries of MCB Camp Pendleton. Therefore, grading and construction activities would not be visible from offbase locations. The flood control project would include the levee structure, spur dikes/silt fences, and borrow sites, which would be visually noticeable to base personnel and visitors. Levee Alignment 1 would be constructed to a maximum height of 27 feet, a maximum length of approximately 16,585 feet, with a service road along the top. Levee slopes would vary between 3:1 and 1:1. The levee would be constructed of fill material with a rock face, which would include rip-rap, and a "honeycomb" pattern concrete material. The flood control project would be a prominent structure of considerable mass, and would have a visible, sloping facade with the appearance of an artificial structure. The levee would be visible from surrounding viewpoints, including the major transportation routes along Vandegrift Boulevard, Basilone Road, MCAS Camp Pendleton, and the Santa Margarita Ranch House complex. This would result in an adverse impact to aesthetics but would not substantially contrast with the character of the surrounding land uses, which include MCAS Camp Pendleton and the Chappo (22) Area.

Levee Alignment 1 would result in the grading of the hillside directly north of the Santa Margarita River, down gradient from the Vade Del Rio (25) Area. The grading of the hillside would smooth the bend in the river to prevent erosion and improve the hydraulics of the river. This upland embankment is a natural, undulating landform consisting of bluffs and hillsides covered with native vegetation including coastal sage scrub. Hillside grading would result in the removal of 280,000 cubic yards of material, and the creation of a steep embankment which would be a visible manufactured slope visible from surrounding viewpoints, including Basilone Road, Vandegrift Boulevard, and the Santa Margarita Ranch House complex. The grading of the hillside would be a significant change to landform and would result in a significant impact to aesthetics and visual resources. The implementation of terraced grading and the revegetation of the slope would reduce

the visual contrast of the denuded hillside form the surrounding vegetated hillsides. However, this would not reduce the significant change in landform visible from surrounding areas to a level less than significant.

With Levee Alignment 1, a series of river training structures (a maximum of three structures) would be constructed within the riverbed to prevent extreme sedimentation or erosion from occurring. The spur dikes would be an earth-core/rock-filled berm that would extend approximately 5 feet above the bed of the river. The spur dikes would trap sediment during low river flows and would accumulate vegetation and natural materials. The spur dikes would have a linear appearance and would blend in to the riverbed or be shielded by riparian woodland and vegetation from surrounding viewsheds along Vandegrift Boulevard, Basilone Road, the Santa Margarita Ranch House complex, and the Vado Del Rio (25) Area. The three upstream spur dikes would have silt fences connected on the end segments. The silt fences consist of a geotextile netting strung across metal fence posts placed in the river perpendicular to the banks. The silt fence netting would not block views and would be shielded by riparian woodland and vegetation from surrounding viewsheds along Vandegrift Boulevard. Impacts to visual resources would not be significant.

Two borrow sites are proposed to provide soils and rocks to construct the flood control project, predominantly to construct the levee structure. The borrow site at East Oscar would be partially visible to Base personnel using the Wilcox Range. The borrow site at Chappo (22) Area would be partially visible to Base personnel and visitors from limited portions of the east end of the Chappo (22) Area. The two borrow sites do not dominate views of a visually unique landform and are not located within sensitive viewsheds. An estimated 530,000 cubic yards of fill material would be required to construct the levee structure and spur dikes. The removal of 530,000 cubic yards of material would result in a significant alteration to landform. However, the borrow sites are not located within sensitive viewsheds. The alteration in landform would not result in a significant impact to visual resources.

Stormwater Management System. The stormwater management system would consist of a pump station constructed in an enclosed building with below grade pipes. The pump station would be constructed within a previously disturbed area adjacent to STP No. 3, and would not result in a substantial change to landform. The pump station would not substantially contrast with the character of the surrounding developed facilities, including STP No. 3 and buildings at the MCAS Camp Pendleton and Chappo (22) Area.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. As discussed under Alternative 3A, the replacement of Basilone Road Bridge along the existing alignment would not result in a significant impact to aesthetics and visual resources.

4.9.2.5 Alternative 1B [Levee Alignment 1 + Bridge Alignment B]

Levee Alignment 1. Alternative 1B includes the same Levee Alignment 1 discussed in Alternative 1A. Levee Alignment 1 would not substantially alter the visual character of the surrounding area. Levee Alignment 1 would require hillside grading which would result in a significant change to landform and visual resources.

Bridge Alignment B - East Curve Alignment. As discussed under Alternative 3B, the replacement of Basilone Road Bridge with this alignment would not result in significant impacts to aesthetics or visual resources.

4.9.2.6 Alternative 1C [Levee Alignment 1 + Bridge Alignment C]

Levee Alignment 2. Alternative 1C includes the same Levee Alignment 1 discussed in Alternative 1A. Levee Alignment 1 would not substantially alter the visual character of the surrounding area. Levee Alignment 1 would require hillside grading which would result in a significant change to landform and visual resources.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. As discussed under Alternative 3C, the replacement of Basilone Road Bridge with this alignment would result in significant impacts to aesthetics and visual resources.

4.9.2.7 Alternative 2A [Levee Alignment 2 + Bridge Alignment A]

Levee Alignment 2. Levee Alignment 2 would be constructed entirely within the Santa Margarita River Valley within the boundaries of MCB Camp Pendleton. Grading and construction activities would not be visible form offbase locations. The flood control project would include the levee structure, six river training structures, and two borrow sites, which would be visually noticeable to Base personnel and visitors. Levee Alignment 2 would be constructed to a maximum height of 27 feet, a maximum length of approximately 15,200 feet, with a service road along the top. Levee slopes would be 1:1 with mechanically reinforced earth. The levee would be constructed of fill materials with a rock face, which would include rip-rip, and a "honeycomb" pattern concrete material.

With Levee Alignment 2, a series of river training structures would be constructed (a maximum of six structures) within the riverbed to prevent extreme sedimentation or erosion from occurring. The river training structure would include three spur dike structures closest to the levee and three spur dike/silt fence structures located farthest from the levee structure similar to those described under Levee Alignment 1. The three upstream spur dikes would have silt fences connected on the end segments. The spur dikes would have a linear appearance and would blend into the riverbed or be

shielded by riparian woodland and vegetation from surrounding viewsheds along Vandegrift Boulevard, Basilone Road, the Santa Margarita Ranch House complex, and the Vado Del Rio (25) Area. The silt fences consist of a geotextile netting strung across metal fence posts placed in the river perpendicular to the banks. The silt fence netting would not block views and would be shielded by riparian woodland and vegetation from surrounding viewsheds along Vandegrift Boulevard. Impacts to aesthetics and visual resources would not be significant.

Levee Alignment 2 would have a borrow site at Chappo (22) Area and a stormwater management system with a pump station similar to Levee Alignment 3. As discussed under Levee Alignment 3, the borrow site would result in significant alteration to landform; however, the borrow site is not located within sensitive viewsheds and would not result in significant impacts to visual resources. The pump station would be constructed within a previously disturbed area adjacent to STP No. 3 and would not result in a substantial change to landform. The pump station would not substantially contrast with the character of the surrounding developed facilities including STP No. 3 and buildings at MCAS Camp Pendleton and Chappo (22) Area. Levee Alignment 2 would not result in significant impact to aesthetics and visual resources.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. As discussed under Alternative 3A, the replacement of Basilone Road Bridge along the existing alignment would not result in a significant impact to aesthetics and visual resources.

4.9.2.8 Alternative 2B [Levee Alignment 2 + Bridge Alignment B]

Levee Alignment 2. Alternative 2B would include the same Levee Alignment 2 discussed in Alternative 2A. Levee Alignment 2 would not substantially alter the visual character of the surrounding area. No significant impacts to aesthetics and visual resources would occur.

Bridge Alignment B - East Curve Alignment. The replacement of Basilone Road Bridge with a bridge which crosses the Santa Margarita River with an eastern curve would result in similar impacts as the existing road alignment. This alternative would be visible from Basilone Road, MCAS Camp Pendleton, and the Santa Margarita Ranch House complex. This alignment would not result in significant impacts to aesthetics or visual resources.

4.9.2.9 Alternative 2C [Levee Alignment 2 + Bridge Alignment C]

Levee Alignment 2. Alternative 2C would include the same Levee Alignment 2 discussed in Alternative 2A. Levee Alignment 3 would not substantially alter the visual character of the surrounding area. No significant impacts to aesthetics and visual resources would occur.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. This bridge alignment would be visible from Basilone Road, Vandegrift Boulevard, the Vado Del Rio (25) Area, and the Santa Margarita Ranch House complex. As discussed under Alternative 3C, the replacement of Basilone Road Bridge with this alignment would result in significant impacts to aesthetics and visual resources.

4.9.2.10 No Action Alternative

Under the No Action Alternative the flood control project would not be implemented and the existing temporary levee would remain in place. No impacts to landform or visual resources would occur with the No Action Alternative. The No Action Alternative would not implement the Basilone Road Bridge Replacement. No impacts to aesthetics or visual resources would occur.

4.9.3 Mitigation Measures

4.9.3.1 Alternatives 1A, 1B, and 1C

Levee Alignment 1 in Alternative 1A, 1B, and 1C would result in significant change to landform from the removal of 280,000 cubic yards of material and the grading of the hillside below the Vado Del Rio (25) Area. The grading of the hillside would result in a significant impact to aesthetics and visual resources. The implementation of terraced grading and the revegetation of the slope would reduce the visual contrast of the denuded hillside from the surrounding vegetated hillsides. However, this would not reduce the significant change in landform visible from surrounding areas to a level less than significant.

4.9.3.2 Alternatives 3C, 1C, and 2C

Bridge Alignment C - Rattlesnake Canyon Road Alignment in Alternatives 3C, 1C, and 2C would result in significant impacts to aesthetics and visual resources. The Rattlesnake Canyon Road Alignment would substantially contrast with the undeveloped character of the Santa Margarita River north of the historic Santa Margarita Ranch House complex. The Rattlesnake Canyon Road Alignment would be a prominent roadway structure with a raised elevation above the Santa Margarita River which would dominate views of the riverbed and riparian woodland within the Santa Margarita River and hillsides next to the Vado Del Rio (25) Area. This bridge alignment would result in significant impacts to aesthetics and visual resources. The regrowth or planting of riparian vegetation and woodland would screen the foundation piers within the riverbed to reduce the visual prominence of the roadway structure to the undeveloped Santa Margarita River. However, the regrowth of planting of riparian vegetation and woodland would not reduce the impact of a raised

road bridge which contrasts with the surrounding visual character of the Santa Margarita River to a level less than significant.

4.9.4 Analysis of Significance

Alternatives 3A, 3B, 2A, and 2B would not result in significant impacts to aesthetics or visual resources.

Alternatives 1A, 1B, and 1C include Levee Alignment 1, which would result in a significant change to landform from the removal of 280,000 cubic yards of material and the grading of the hillside below the Vado Del Rio (25) Area. The grading of the hillside would result in a significant, unmitigable impact to aesthetics and visual resources.

Alternatives 3C, 1C, and 2C include Bridge Alignment C - Rattlesnake Canyon Road Alignment which would result in a prominent roadway structure with a raised elevation above the Santa Margarita River, which would dominate views of the riverbed and riparian woodland within the Santa Margarita River and hillsides next to the Vado Del Rio (25) Area. This bridge alignment would result in a significant, unmitigable impact to aesthetics and visual resources.

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4.10 SAFETY AND ENVIRONMENTAL HEALTH

4.10.1 Criteria for Significance Determination

This section addresses the potential for the proposed project to affect the safety and environmental health of persons living, working, or visiting at or in the vicinity of MCB Camp Pendleton, including military personnel and civilians. Public health and safety is maintained by the establishment of minimum safety distances for personnel and habitable structures from potentially hazardous operations or locations. Designated airfield safety clearances and Accident Potential Zones (APZs) delineate areas with potential for aircraft-related mishaps. To maintain minimum safety distances, Explosive Safety Quantity Distance (ESQD) arcs are created around explosives storage and handling areas.

A project would have a significant impact to safety and environmental health if it:

- Increases hazards to airfield safety according to air traffic control specialists; or

- Substantially increases hazards related to APZs, explosives safety, and hazardous materials contamination beyond existing levels.

4.10.2 Airfield Safety - Impact Analysis

4.10.2.1 Alternative 3A [Levee Alignment 3 + Bridge Alignment A] Preferred Alternative

Levee Alignment 3. Levee Alignment 3 would be constructed along the north border of the MCAS Camp Pendleton airfield to protect the runway and airfield facilities from a flood of up to 100 years in magnitude. Levee Alignment 3 would be constructed to avoid the Type I Clear Zones located at each end of the runway. Levee Alignment 3 would be constructed within the Type III Clear zones located at each end of the runway; however, the levee structure would not penetrate the Approach-Departure Clearance Surface and would not include buildings for human habitation. Therefore, Levee Alignment 3 would not conflict with the Type I and III Clear Zones, and would not result in a significant impact to airfield safety.

The MCAS Camp Pendleton Master Plan guidelines for land use compatibility indicates that land uses with very low population densities are compatible within APZ designations. The levee structure would not be inhabited and would not increase population densities within the APZs. Therefore, the flood control improvement would not contribute to significant impacts to airfield safety.

Stormwater Management System. The stormwater management system would consist of a pump station, which would be within an enclosed building, with below grade pipes constructed into the southwest end of the levee. The pump station would be constructed southwest of the MCAS Camp Pendleton runway and would not be located within a Clear Zone or penetrate an Approach-Departure Clearance Surface. The pump station would be located within the APZ I designated on the southwest end of the MCAS Camp Pendleton runway. The stormwater management system would not be inhabited and would not increase population densities within the APZ I. The stormwater management system would not conflict with airfield safety clearances and APZs, and therefore, would not result in significant impacts to airfield safety.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. Bridge Alignment A would be constructed along the existing Basilone Road Bridge alignment, which is located within the Type III Clear Zone located approximately 1,400 feet from the northeast end of Runway 21. Roads are allowed within a Type III Clear Zone. However, vehicles must not encroach into the Approach-Departure Clearance Surface. Basilone Road Bridge is located under the Approach-Departure Clearance Surface which has a 40:1 slope. Thus, with a runway elevation of 77 feet above MSL and a 15-foot vehicle clearance, the maximum allowable height of the proposed bridge would be 104 feet above MSL.

This proposed project alignment would include a traffic light, controlled by the MCAS Camp Pendleton air traffic control tower, to stop vehicles during approaches and departures of military aircraft. With the incorporation of this traffic control measure, the proposed Alignment A would not result in the encroachment of a structure or vehicles into the airfield safety clearance zones. The traffic control measure would reduce the impact to airfield safety to a level less than significant.

4.10.2.2 Alternative 3B [Levee Alignment 3 + Bridge Alignment B]

Levee Alignment 3. Alternative 3B would include the same levee alignment discussed in Alternative 3A. Levee Alignment 3 would not conflict with the Type I and III Clear Zones on APZ I and II and would not result in a significant impact to airfield safety.

Bridge Alignment B - East Curve Alignment. The replacement of Basilone Road Bridge with an East Curve Alignment would shift the roadway approach on the south side of the Santa Margarita River to the east. This proposed alignment would be located within the Type III Clear Zone but would not encroach into the Approach-Departure Clearance Surface. Therefore, the East Curve Alignment would not conflict with airfield safety clearances and would not result in significant impacts to airfield safety.

4.10.2.3 Alternative 3C [Levee Alignment 3 + Bridge Alignment C]

Levee Alignment 3. Alternative 3C would include the same levee alignment discussed in Alternative 3A. Levee Alignment 3 would not conflict with the Type I and III Clear Zones on APZ I and II and would not result in a significant impact to airfield safety.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. This proposed alignment would be approximately 1,200 feet to the northeast of the existing road alignment. The Rattlesnake Canyon Road Alignment would be a transportation route, which is a compatible land use within APZ I. Under this alternative, the bridge and vehicles would not encroach into the Approach-Departure Clearance Surface. The Rattlesnake Canyon Road Alignment would not conflict with airfield safety clearances and would not result in significant impacts to airfield safety.

4.10.2.4 Alternative 1A [Levee Alignment 1 + Bridge Alignment A]

Levee Alignment 1. Levee Alignment 1 would be constructed to avoid the Type I Clear Zones located at each end of the runway. Levee Alignment 1 would be constructed within the Type III Clear Zones located at each end of the runway; however, the levee structure would not penetrate the Approach-Departure Clearance Surface and would not include buildings for human habitation. Therefore, Levee Alignment 1 would not conflict with the Type I and III Clear Zones, and would not result in a significant impact to airfield safety.

The MCAS Camp Pendleton Master Plan guidelines for land use compatibility indicate that land uses with very low population densities are compatible with APZ designations. The levee structure would not be inhabited and would not increase population densities within the APZ. Therefore, the flood control improvement would not contribute to significant impacts to airfield safety and environmental health.

Stormwater Management System. The stormwater management system would not be inhabited and would not increase population densities within the APZ I. The stormwater management system would not conflict with airfield safety clearances and APZs, and therefore, would not result in significant impacts to airfield safety and environmental health.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. As discussed under Alternative 3A, the replacement of the Basilone Road Bridge along the existing road alignment would be constructed along the existing Basilone Road Bridge alignment, which is located within the Type III Clear Zone approximately 1,400 feet from the northeast end of Runway 21.

This proposed project alignment would include a traffic light controlled by the MCAS Camp Pendleton air traffic control tower to stop vehicles during approaches and departures of military aircraft which utilize the full reach of the Approach-Departure Clearance Surface. With the incorporation of this traffic light, the proposed Existing Alignment would not result in the encroachment of structure or vehicles into the airfield safety clearance zones. The traffic light would reduce the impact to airfield safety to a level less than significant.

4.10.2.5 Alternative 1B [Levee Alignment 1 + Bridge Alignment B]

Levee Alignment 1. Alternative 1B includes the same levee alignment discussed in Alternative 1A. Levee Alignment 1 would not conflict with the Type I and III Clear Zones or APZs I and II, and would not result in a significant impact to airfield safety.

Bridge Alignment B - East Curve Alignment. The proposed replacement of Basilone Road Bridge with an East Curve Alignment would shift the roadway approach on the south side of the Santa Margarita River to the east. This alignment would be located within the Type III Clear Zone, but would not encroach into the Approach Departure Clearance Surface. The East Curve Alignment would not conflict with airfield safety clearances and would not result in significant impacts to airfield safety.

4.10.2.6 Alternative 1C [Levee Alignment 1 + Bridge Alignment C]

Levee Alignment 1. Alternative 1C includes the same levee alignment discussed in Alternative 1A. Levee Alignment 1 would not conflict with the Type I and III Clear Zones or APZs I and II, and would not result in a significant impact to airfield safety.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. This road alignment would construct a new bridge within an APZ. The bridge and vehicles would not encroach into the Approach-Departure Clearance Surface. The Rattlesnake Canyon Road Alignment would not conflict with airfield safety clearances and would not result in significant impacts to airfield safety.

4.10.2.7 Alternative 2A [Levee Alignment 2 + Bridge Alignment A]

Levee Alignment 2. Levee Alignment 2 would be constructed to avoid the Type I Clear Zones located at each end of the runway. Levee Alignment 2 would be constructed within the Type III Clear zones located at each end of the runway; however, the levee structure would not penetrate the Approach-Departure Clearance Surface and would not include buildings for human habitation. Therefore, Levee Alignment 2 would not conflict with the Type I and III Clear Zones. and would not result in a significant impact to airfield safety.

The MCAS Camp Pendleton Master Plan guidelines for land use compatibility indicates that land uses with very low population densities are compatible with APZ designations. The levee structure would not be inhabited and would not increase population densities within the APZ I. Therefore, the flood control improvement would not contribute to significant impacts to airfield safety and environmental health. The stormwater management system would not be inhabited and would not increase population densities within the APZ I. The stormwater management system would not conflict with airfield safety clearances and APZs; and therefore, would not result in significant impacts to airfield safety and environmental health.

Bridge Alignment A - Existing Basilone Road Bridge Alignment. As discussed under Alternative 3A, the replacement of Basilone Road Bridge along the existing road alignment would place vehicles on the road bridge, including high-profile trucks and military equipment at an elevation which would encroach into the Approach-Departure Clearance Surface. This project alignment would result in a significant impact to airfield safety. The bridge and road itself would not encroach into the airfield Approach-Departure Clearance Surface; however, vehicles and equipment utilizing the road bridge would penetrate the imaginary surface.

This proposed project alignment would include a traffic light, controlled by the MCAS Camp Pendleton air traffic control tower, to stop vehicles during approaches and departures of military aircraft. With the incorporation of this traffic light, the proposed Existing Alignment would not result in the encroachment of a structure or vehicles into the airfield safety clearance zones. The traffic control light would reduce the impact to airfield safety to a level less than significant.

4.10.2.8 Alternative 2B [Levee Alignment 2 + Bridge Alignment B]

Levee Alignment 2. Alternative 2B would include the same levee alignment discussed in Alternative 2A. Levee Alignment 2 would not conflict with the Type I and III Clear Zones on APZs I and II, and would not result in a significant impact to airfield safety.

Bridge Alignment B - East Curve Alignment. The replacement of Basilone Road Bridge with an East Curve Alignment would shift the roadway approach on the south side of the Santa Margarita River to the east. This alignment would be located within the Type III Clear Zone, but would not encroach into the proposed Approach Departure Clearance Surface. The East Curve Alignment would not conflict with airfield safety clearances and would not result in significant impacts to airfield safety.

4.10.2.9 Alternative 2C [Levee Alignment 2 + Bridge Alignment C]

Levee Alignment 2. Alternative 2C would include the same levee alignment discussed in Alternative 2A. Levee Alignment 2 would not conflict with the Type I and III Clear Zones on APZs I and II, and would not result in a significant impact to airfield safety.

Bridge Alignment C - Rattlesnake Canyon Road Alignment. This proposed alignment would construct a new bridge within an APZ. The bridge and vehicles would not encroach into the Approach-Departure Clearance Surface. The Rattlesnake Canyon Road Alignment would not conflict with airfield safety clearances and would not result in significant impacts to airfield safety.

4.10.3 Explosives Safety

To maintain minimum safety distances, explosive safety quantity distance (ESQD) arcs are created around explosives storage and handling areas. Existing ESQD arcs would not be changed or altered as a result of the implementation of the proposed flood control project. One ESQD arc is identified on MCAS Camp Pendleton (Figure 3.10-2).

4.10.3.1 Alternatives 3A, 3B, and 3C [Levee Alignment 3 + Bridge Alignments A - C]

Levee Alignment 3. Levee Alignment 3 would be constructed along the north border of the MCAS Camp Pendleton airfield. The central segment of Levee Alignment 3 would be constructed within the designated 1,250-foot radius of an ESQD arc. The flood control project would not be an inhabited facility. Levee Alignment 3 would be a compatible use within ESQD standards as the flood control improvement would not have aboveground utilities or fuel storage areas. The stormwater management system would consist of a pump station, which would not be located within an ESQD arc. Therefore, Levee Alignment 3 would not result in significant impacts to explosives safety.

Bridge Alignments A through C. All three bridge alignments would be constructed and operated outside of the ESQD arc at MCAS Camp Pendleton. Therefore, no significant impacts to explosives safety would occur.

4.10.3.2 Alternatives 1A, 1B, and 1C [Levee Alignment 1 + Bridge Alignments A - C]

Levee Alignment 1. Levee Alignment 1 would be constructed along the north border of the MCAS Camp Pendleton airfield. The central segment of Levee Alignment 1 would be constructed within the designated 1,250-foot radius of an ESQD arc. The flood control project would not be an

inhabited facility. Levee Alignment 1 would be a compatible use within ESQD standards, as the flood control improvement would not have aboveground utilities or fuel storage areas. The stormwater management system would consist of a pump station, which would not be located within an ESQD arc. Therefore, Levee Alignment 1 would not result in significant impacts to explosives safety.

Bridge Alignments A through C. All three bridge alignments would be constructed and operated outside of the ESQD arc at MCAS Camp Pendleton. Therefore, no significant impacts to explosives safety would occur.

4.10.3.3 Alternatives 2A, 2B, and 2C [Levee Alignment 2 + Bridge Alignments A - C]

Levee Alignment 2. Levee Alignment 2 would be constructed along the north border of the MCAS Camp Pendleton airfield. The central segment of Levee Alignment 2 would be constructed within the designated 1,250-foot radius of an ESQD arc. The flood control project would not be an inhabited facility. Levee Alignment 2 would be a compatible use within ESQD standards, as the flood control improvement would not have aboveground utilities or fuel storage areas. The stormwater management system would consist of a pump station, which would not be located within an ESQD arc. Therefore, Levee Alignment 2 would not result in significant impacts to explosives safety.

Bridge Alignments A through C. All three bridge alignments would be constructed and operated outside of the ESQD arc at MCAS Camp Pendleton. Therefore, no significant impacts to explosives safety would occur.

4.10.4 Environmental Health - Hazardous Materials

Impacts are considered significant if the storage, use, transportation, or disposal of hazardous materials and wastes would increase human health risks from environmental exposure.

Construction-Related Impacts. Construction activities such as clearing, grading and excavating would not create additional hazardous waste release sites. However, construction-related activities adjacent to or on an existing hazardous waste release site could pose a threat to human health and safety, or to the environment as a result of exposure to contaminated soils or groundwater.

Operational Impacts. Operation of the flood control components which would require the use of diesel fuel for diesel pump operations. Releases of fuel and hazardous substances would be prevented or remediated in accordance with approved spill response plans and all applicable laws and regulations.

4.10.4.1 Alternatives 3A, 3B, and 3C [Levee Alignment 3 + Bridge Alignments A-C]

Levee Alignment 3. IR Program Site (25L) is located in the immediate vicinity of the proposed construction activities for the flood control project. Regulatory concurrence through the IR procedures has determined that Site 25L contamination is below action level and does not pose a risk to human and environmental health. Therefore, no further action has been recommended in the Record of Decision (ROD) signed in 1994. Construction of the proposed levee would include appropriate cleanup measures, as determined by risk assessments, and appropriate regulatory concurrence on remedial actions. Characterization and remediation would occur at these locations, including Site 25L, as part of the IR Program and state cleanup; therefore, significant construction impacts would not occur. Operation of the levee structure would not involve fuel or hazardous substances. Therefore, no operational impacts associated with hazardous waste would occur.

Stormwater Management System. Two IR Program Sites (4 and 4A) are located in the vicinity of the pump station. Sites 4 and 4A have been recommended for no further action, in a ROD signed in 1995. Construction of stormwater management system components would include appropriate cleanup measures, as determined by risk assessments, and appropriate regulatory concurrence on remedial actions. Characterization and remediation would occur at these locations, including Sites 4 and 4A, as part of the IR Program and state cleanup; therefore, significant construction impacts would not occur.

The stormwater management system would include temporary inundation in the detainage area south of Chappo (22) Area. Site 6 is located in this detainage area. The soil removal action at Site 6 would be completed prior to construction of the Flood Control Project. It was determined that there would be no significant impacts due to temporary inundation as long as the removal action was complete at Site 6 (Jacobs Engineering Group, 1995).

The pump station would require the use and storage of diesel fuel. The pump station would have six 200 horsepower diesel fired, engine-driven pumps. Diesel would be stored in a 10,000-gallon storage tank which would be steel-line and installed above ground. Diesel piping would be double-walled polyethylene. Fuel or hazardous substance releases would be prevented or remediated, in accordance with approved spill response plans and all applicable laws and regulations; therefore, significant operational impacts associated with hazardous waste release would not occur.

Bridge Alignments A through C. No IR Program Sites are located in the immediate vicinity of the proposed construction activities for the bridge alignments. Therefore, no significant impacts to environmental health would occur.

4.10.4.2 Alternatives 1A, 1B, and 1C [Levee Alignment 1 + Bridge Alignments A - C]

Levee Alignment 1. Levee Alignment 1 would be constructed in the vicinity of IR Program Site 25L. Characterization and remediation would occur at Site 25L as part of the IR Program and state cleanup. Therefore, no significant construction impacts to environmental health would occur. Operation of the levee structure would not involve fuel or hazardous substances. Therefore, no operational impacts associated with hazardous waste would occur.

Bridge Alignments A through C. No IR Program Sites are located in the immediate vicinity of the proposed construction activities for the bridge alignments. Therefore, no significant impacts to environmental health would occur.

4.10.4.3 Alternatives 2A, 2B, and 2C [Levee Alignment 2 + Bridge Alignments A - C]

Levee Alignment 2. Levee Alignment 2 would be constructed in the vicinity of IR Program Site 25L. Characterization and remediation would occur at Site 25L as part of the IR Program and state cleanup. Therefore, no significant construction impacts to environmental health would occur. Operation of the levee structure would not involve fuel or hazardous substances. Therefore, no operational impacts associated with hazardous waste at MCAS Camp Pendleton would occur.

Bridge Alignments A through C. No IR Program Sites are located in the immediate vicinity of the proposed construction activities for the bridge alignments. Therefore, no significant impacts to environmental health would occur.

4.10.5 No Action Alternative

With the No Action Alternative, construction of a flood control project, stormwater management system, or bridge replacement project would not be implemented. The existing levee would continue to provide the primary flood control protection, which is not capable of containing peak discharges greater than a 50-year flood event (46,000 cfs). Thus, the recurrence of floods like that in 1993 would result in significant impacts to the safety and environmental health of persons living and working at MCAS Camp Pendelton and the Chappo (22) Area of MCB Camp Pendleton. In addition, damage to airfield assets from flooding would jeopardize airfield safety and indirectly result in possible injury and death of workers at MCAS Camp Pendleton. Destruction of property at MCB Camp Pendleton, such as STP No. 3, would result in the contamination of surface water. In addition, the length of the existing levee would not be adequate to prevent inundation of IRP sites located in the Chappo (22) Area. This would increase the possibility of spreading environmental contaminants to nearby base water production wells. A flooding event could also contaminate base production wells with naturally present analytes such as TDS and reduce the quality of potable water.

The temporary bridge on Basilone Road, which replaced the bridge destroyed in the 1993 flood, would continue to be the only primary north-south access from MCAS Camp Pendleton, Chappo (22) Area and the Headquarters Area of MCB Camp Pendleton under the No Action Alternative. This bridge structure would continue to create a constriction in the Santa Margarita River that was a key factor in the breech of the levee in the 1993 flood. The loss of this bridge due to flooding or the inability to withstand long term usage for design reasons would also result in significant safety impacts because of emergency access.

4.10.6 Mitigation Measures

Impacts to safety would occur with implementation of Alternatives 3A, 1A, and 2A. The Basilone Road Bridge Replacement - Alignment A would result in a significant impact to airfield safety as vehicles on the bridge would encroach into the airfield Approach-Departure clearance surface. This alignment would include a traffic light controlled by the MCAS Camp Pendleton air traffic control tower to stop vehicles during approaches and departures of aircraft. The incorporation of this traffic control measure would reduce the impact to airfield safety to a level less than significant.

4.10.7 Analysis of Significance

No impacts to safety and environmental health would occur with the proposed project alternatives after mitigation.

5.0 CUMULATIVE IMPACTS

5.0 CUMULATIVE IMPACTS

The National Environmental Policy Act (NEPA) requires an analysis of the incremental effects of a project that are cumulatively significant when analyzed in connection with other past, present, and reasonably foreseeable future actions. The contribution of the project in question to overall cumulative impacts in the area is of particular concern. In general, effects of a particular action or group of actions must meet the following criteria to be considered cumulative impacts:

- Effects of several actions occur in a common locale or region;
- Effects are not localized (i.e., can contribute to effects of an action in a different location);
- Effects on a particular resource are similar in nature (i.e., affects the same specific element of a resource); and
- Effects are long-term; short-term impacts dissipate over time and cease to contribute to cumulative impacts.

This section discusses potential cumulative impacts resulting from the construction, operation, and maintenance of the Proposed Action. Cumulative impacts are defined by the Council on Environmental Quality (CEQ) (40 CFR 1508.7) as:

> The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or Non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

5.1 OTHER PLANNED ACTIONS

The cumulative project impact area associated with the Proposed Action is comprised of a number of other projects that could, in conjunction with the Proposed Action, directly produce significant cumulative impacts. The following discussion provides descriptions of the projects on Marine Corps Base (MCB) Camp Pendleton and Marine Corps Air Station (MCAS) Camp Pendleton within the lower Santa Margarita River Basin that may contribute to potential cumulative impacts.

5.1.1 MCB Camp Pendleton MILCON Projects

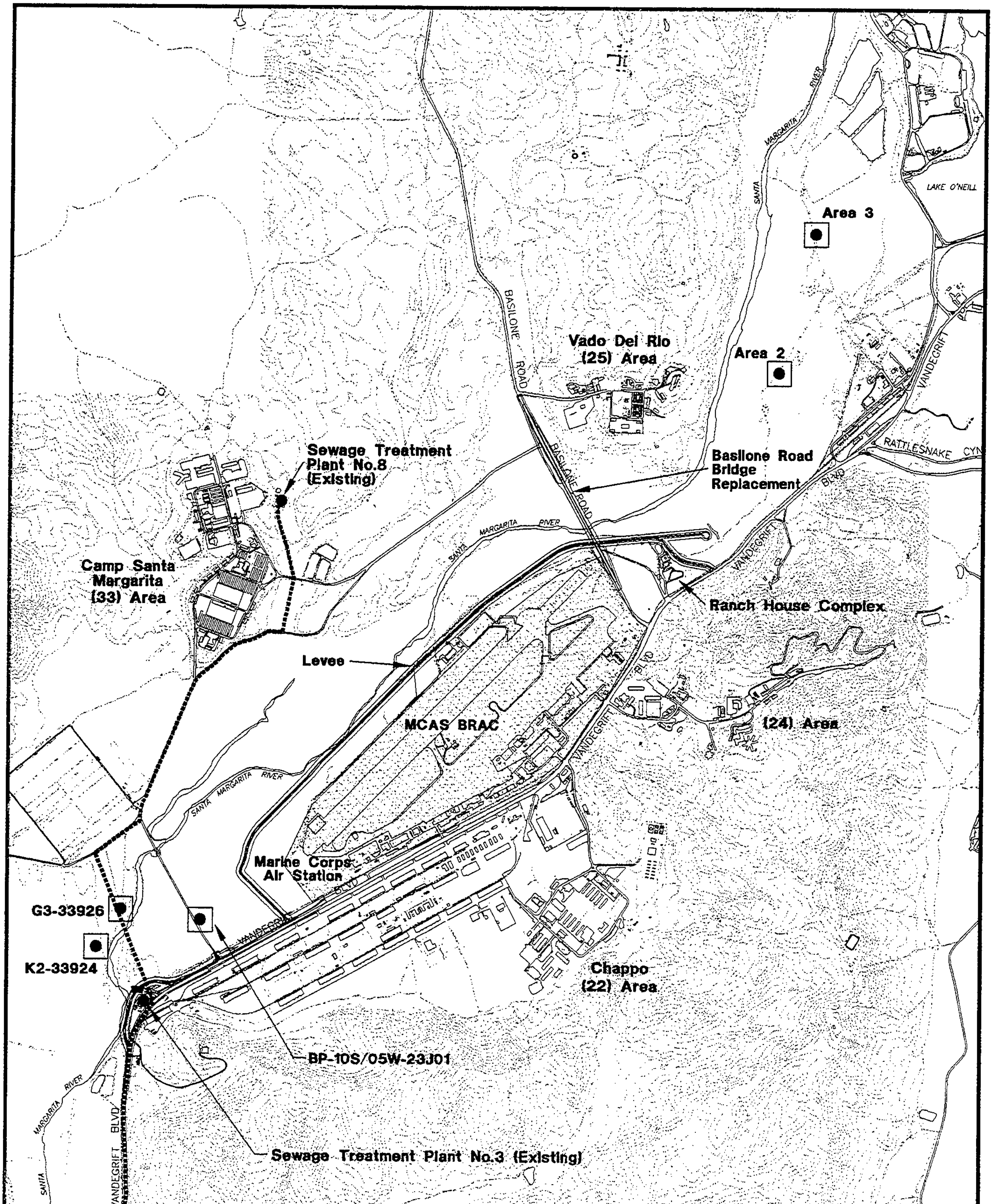
5.1.1.1 Santa Margarita River Water Wells Project (P-659)

This project would involve the construction of four new water production wells in the lower Santa Margarita River basin (Figure 5.1-1). MCB Camp Pendleton obtains all potable water used on the installation from water wells located within four groundwater basins. During 1993, severe flooding inundated and/or damaged all 14 of the water wells constructed without sanitary seals in the lower Santa Margarita River basin. When the wells without sanitary seals were inundated, surface water contaminated groundwater. Additionally, some of the existing water wells were also subject to mechanical failure due to age.

An environmental assessment was completed (Final EA) and the Finding of No Significant Impact (FONSI) signed in December 1996. The new water production wells will be constructed in the lower Santa Margarita River basin beginning in September 1997 and completed in May 1988. The wells combined would produce from 3,500 to 5,000 gallons per minute (gpm) of potable water for MCB Camp Pendleton. The new water wells would replace water wells damaged during the 1993 floods and increase the reliability of the current water well system. The typical well design consists of a steel well casing, a 125-horsepower submersible pump, piping, and electrical control equipment located on a steel platform. The construction of the five water wells would result in the removal of 4.56 acres of habitat (3.39 acres of grass forb and 1.17 acres of mixed willow exotic). In accordance with the criteria provided in the Biological Opinion, the impacts to biological resources will require mitigation through the implementation of an invasive exotic vegetation control program for 5.49 acres.

5.1.1.2 Lower Santa Margarita River Basin Sewage Effluent Compliance Project (P-527)

This project would provide for the termination of discharge of secondary treated effluent into the lower Santa Margarita River basin. This project would include the construction and operation of a system of pumps, pipelines, and associated facilities to convey treated effluent from five existing base sewage treatment plants to an existing ocean outfall in the City of Oceanside. The system would be comprised of four new pump stations and the upgrade of an existing station, installation of approximately 19 miles (31 kilometers) of new pipeline, and 22 acres (9 hectares) of new storage ponds located at the southern end of the base near Sewage Treatment Plant (STP) No. 13. One leg of the new pipeline system, the Santa Margarita Alignment, would be constructed in proximity to the flood control project. The proposed pipeline, as depicted on Figure 5.1-1, would convey treated effluent southwest from STP No. 8 located west of the river near Area 33 to a point south of Wilcox Rifle Range. The pipeline would be slant drilled beneath the Santa Margarita River to the southeast to a point near



Planned Projects at MCB Camp Pendleton

Figure 5.1-1

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STP No. 3. From the connection point near STP No. 3, the pipeline would follow the alignment of Vandegrift Boulevard south to connect with the other leg of the system from the Headquarters Area (STP No. 13) and eventually the Oceanside outfall. The majority of the project features would be constructed in existing roadways, disturbed rights-of-way, and in an abandoned railroad right-of-way. Construction is scheduled to begin in 1997. The project would require approximately a year to complete.

5.1.2 MCAS Camp Pendleton Base Realignment and Closure (BRAC) Construction Projects

This BRAC action, unlike the other proposed MILCON projects, would realign military assets from the MCAS Tustin and MCAS El Toro to MCAS Camp Pendleton. This action would involve the relocation of selected personnel, aircraft, and equipment, and construction of new facilities to accommodate the realigned assets. The Proposed Action, described as Alternative B in the Final EIS (March 1996), would include construction of new facilities within the air station to accommodate an additional 52 rotary-wing aircraft and 800 personnel for a total of 185 aircraft and 3,900 personnel at MCAS Camp Pendleton. These would include facilities for refueling and fuel storage, training and administrative functions, warehousing and special storage, and aircraft and airfield maintenance. The additional personnel would also require construction of new Bachelors Enlisted Quarters (BEQ) in Chappo (24) Area, including dormitories, fitness facilities, and associated utility systems and parking. Construction of facilities associated with this Proposed Action would be accomplished through six BRAC projects anticipated to occur between 1997 and 1999. Aircraft and personnel are projected to begin arriving in the same time frame as the new facilities are completed. The Record of Decision (ROD) for the environmental impact statement (EIS) was signed in January 1997.

5.1.3 MCAS Camp Pendleton MILCON Projects

5.1.3.1 Ultimate Clear Zone (Project PA303M)

Aircraft operation safety guidelines established by Naval Air Systems Command (NAVAIR) requires that a zone cleared of all obstructions be established at the end of all active runways. This zone shall extend 500 feet on either side of the center line of the runway and overrun and shall extend 1,000 feet from the end of the runway. Construction activity under this project would include clearing all vegetation except grass within this 27-acre area (1,000 x 1,000 feet). Mitigation measures will be established as part of the NEPA process in accordance with terms of the Biological Opinion. Currently, this project is programmed but not funded. The environmental documentation for this project has not begun.

5.1.3.2 Convert Short Approach Landing System to Airfield Lighting Sequence Flashing System (Project PA403R)

This project would upgrade the short Approach Land System (SALS) approach lighting to an Airfield Lighting Sequence Flashing System (ALSF-1). Each lighting unit of the ALSF-1 system would consist of support poles with cross arms for the light mountings. Work would need to be completed during the dry season (partial breeding season), in order to facilitate construction access within the river. The project has not been scheduled for construction, and is unfunded.

5.1.3.3 Communications/Electrical Infrastructure (P-004; Fiscal Year [FY] 95)

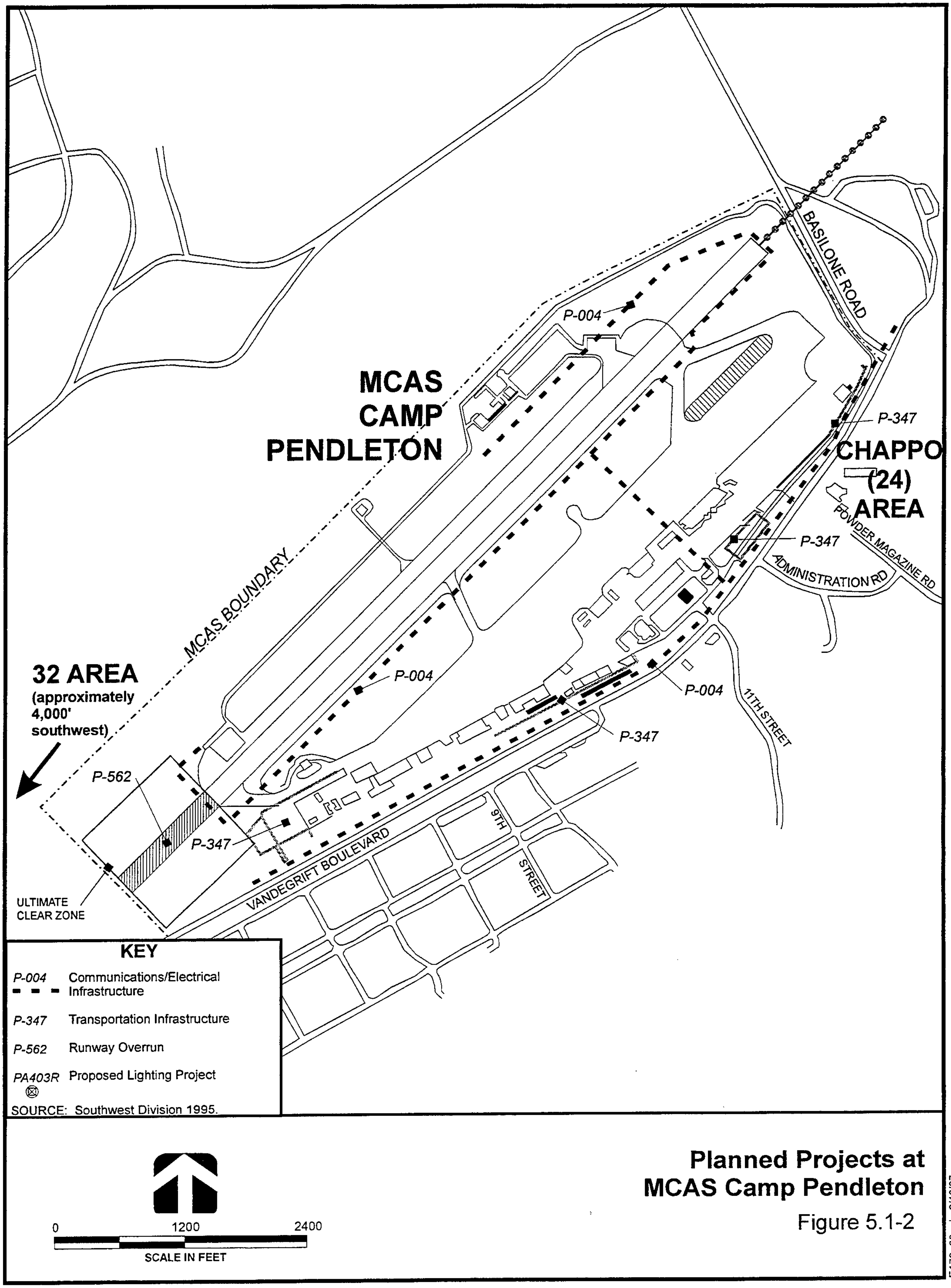
This project was originally programmed for FY 1995. However, construction is now underway and is scheduled to be completed by December 1997. Construction would involve approximately 18,000 linear feet of underground electrical duct bank with cables. The system will replace aging infrastructure supporting airfield lighting, radar and weather equipment, and primary electrical distribution for buildings and telephones. Potential impacts were identified for resources including air quality during construction and hydrology. A categorical exclusion has been completed for this project (Figure 5.1-2).

5.1.3.4 Transportation Infrastructure (P-347; FY 97)

This project will involve the construction of an additional Troop Staging Area and roads and parking lots on the air station to create a logical, safe, and efficient layout of the local transportation system. This project corrects long-standing deficiencies. Due to the disturbed condition of the construction area, potential impacts would be limited to air quality during construction, hydrology (surface water only), and transportation (beneficial). A categorical exclusion has been completed for this project (Figure 5.1-2). Construction of the project will be completed by December 1997.

5.1.3.5 Runway Overrun (P-562; FY 97)

This project would construct a paved area at the end of the MCAS Camp Pendleton runway to protect aircraft from damage in an aviation mishap event. The proposed project would involve the construction of a 1,000-foot-long by 200-foot-wide paved runway overrun area extending from and attached to the end of the existing 6,000-foot-long runway. The project would include asphaltic concrete paving, drainage improvements, and electrical conduit. Potential impacts are anticipated in the areas of air quality, hydrology, biological resources (approximately 2.7 acres of impact on riparian habitat), and aircraft operations during construction. A previously prepared EA is currently



Planned Projects at MCAS Camp Pendleton

Figure 5.1-2

being updated to address the impacts associated with this project (Figure 5.1-2). Construction is scheduled to be completed by December 1997.

5.2 ENVIRONMENTAL IMPACTS

The proposed Santa Margarita River Flood Control Project (P-010) and the Basilone Road Bridge Replacement (P-030) and the eight proposed projects were evaluated for cumulative impacts related to the environmental resources discussed in this EIS. The localized nature of certain environmental effects, the short-term nature and timing of the construction effects, and comprehensive basewide policies for managing environmental resources and mitigation of impacts are all factors which were considered in the significance of the cumulative impacts. The potential cumulative impacts for each of the environmental resources affected by cumulative impacts are discussed below.

NEPA requires only a discussion of those cumulative impacts with the potential for significance. As indicated in the project description above, each of the projects have addressed potential environmental impacts in project-specific NEPA documentation. Most of the potential impacts of these projects are either insignificant or have been mitigated to a level below significance. The following discussion of cumulatively significant impacts considers those impacts that may be individually insignificant, but cumulatively significant for the resources affected.

The long term impacts of the Proposed Action on geology, seismicity, and soils; land use; and safety and environmental health would be either insignificant or reduced to a level below significance through mitigation measures. Environmental documentation for the other planned projects at MCB Camp Pendleton or MCAS Camp Pendleton have also concluded that potential impacts to these resources would be insignificant or mitigable. Through appropriate design and standard construction practices, the Proposed Action and the other projects would not result in a significant cumulative impact on geological resources. The potential long-term loss of hydric soils and the associated impacts on wetlands is collectively addressed along with other impacts on biological resources in Section 5.2.1 below.

Development of the Proposed Action and the other planned projects are all consistent with the ongoing master planned development of both MCB Camp Pendleton and MCAS Camp Pendleton within the collective project areas. Potential siting conflicts between the various projects that could result in long-term land use impacts have been avoided through adherence to airfield safety criteria and environmental health regulations and requirements. Where applicable, mitigation measures would resolve significant conflicts in project related uses. Therefore, the Proposed Action would not contribute to a significant cumulative impact to land use or safety and environmental health resources.

5.2.1 Biological Resources

Because the proposed projects would occur in the lower Santa Margarita River basin, one of MCB Camp Pendleton's most sensitive biological resources, project construction and operation activities may have potential significant cumulative impacts on biological resources. To address the potential significant cumulative impacts to these sensitive biological resources, MCB Camp Pendleton has consulted with the U.S. Fish and Wildlife Service (USFWS) on a Riparian and Estuarine Ecosystem Conservation Program. A Biological Assessment (U.S. Fish and Wildlife Service, 1994) and subsequent Biological Opinion (U.S. Fish and Wildlife Service, 1995) were prepared addressing the programmatic impacts and mitigation requirements for various projects in these ecosystems on MCB Camp Pendleton, including those identified above. MCB Camp Pendleton will apply this programmatic consultation to all ongoing and future actions in the Santa Margarita River basin as they potentially affect the integrity of riparian and estuarine/beach ecosystems. Thus, the Biological Opinion (U.S. Fish and Wildlife Service, 1995) addresses the potential cumulative impacts on federally listed and proposed species from the Santa Margarita River Flood Control Project (P-010), Basilone Road Bridge Replacement (P-030), the Water Wells Project (P-659) and the Sewage Effluent Compliance Project (P-527) located in the Santa Margarita River flood plain and riparian system. The Biological Opinion (U.S. Fish and Wildlife Service, 1995) also establishes a procedure for addressing future actions that were not covered under the initial biological assessment. Biological resources affected by the proposed BRAC activities have been evaluated in a separate environmental impact study and required separate concurrence from the USFWS as being in accordance with the future action procedures established by the Biological Opinion (U.S. Fish and Wildlife Service, 1995) to meet Section 7 of the Endangered Species Act requirements (U.S. Navy, 1996).

The permanent long-term effects of P-010, P-030, P-659 and P-527 would result in cumulative impacts to biological resources. However, USFWS has determined that these projects would not jeopardize the continued existence of the three federally-listed endangered species and one federally-listed threatened species that occur in the collective APE for these projects. Through the implementation of various habitat enhancement and management features of MCB Camp Pendleton's Comprehensive Riparian Conservation Program and project-specific habitat replacement mitigation measures, direct and cumulative impacts would be minimized. Wetlands impacts are being coordinated with the ACOE as a separate process under the Clean Water Act (Section 404 permit). Mitigation measures for each of the other projects have been addressed in completed environmental documents or would be addressed in subsequent environmental documents in accordance with the terms of the programmatic Biological Opinion (U.S. Fish and Wildlife Service, 1994).

5.2.2 Hydrology/Groundwater

The Proposed Action in conjunction with other projects detailed in this section is not expected to have a direct significant impact on groundwater resources due to continued recharge occurring in the river basin and the temporary detainage and discharge of stormwater runoff into the river. The Final EIS for the BRAC project determined that the addition of new personnel could result in potential long-term overdraft of groundwater resources (U.S. Navy, 1996). Mitigation measures for the BRAC projects, including limitations of water supply to the safe yield of groundwater sources, and implementation of water conservation measures to reduce and control water demand would be sufficient to reduce any significant impact to a level below significance. Therefore, there would be no significant cumulative impact to groundwater levels.

The groundwater resources in the lower Santa Margarita River basin were modeled and studied to assess potential impacts from the sewage effluent compliance project (P-527). In assuming that the project would comply with the current requirements for managed water withdrawal, the EIS concluded that "if the wastewater discharges are removed from the Upper Ysidora, Chappo, and Ysidora subbasins, sufficient water will exist in the subbasins to support the current riparian vegetation during average and above-average years of precipitation." The assessment did note that during an extended drought (15 years), depths to water may decrease by 5 feet or more. Potential impacts to groundwater levels and associated riparian habitat would occur down gradient of the point where discharges are proposed to be discontinued. To offset the potential impacts, the *Programmatic Groundwater/Riparian Habitat Assessment* identified various measures to monitor and mitigate these impacts. From a list of 11 potential mitigation measures recommended, the following 4 measures were determined to be the most feasible: upstream discharge of tertiary-treated effluent; retention pond management at STP No. 3; groundwater extraction management; and Arundo removal. This monitoring and mitigation program would be conducted by MCB Camp Pendleton as part of the sewage effluent compliance project (P-527).

The water wells project (P-659) would not in and of itself result in significant impacts on the supply of groundwater, because the wells do not generate the water demand. The proposed wells would simply increase the reliability of the water supply system to deliver the required water supplies. In addition, the upgraded well systems with sanitary seals and pumps elevated above the 100-year flood level would alleviate impacts to groundwater quality. The EA assumed that water withdrawals would be limited to the safe yield of the aquifer. This is the same assumed mitigation measure adopted by other major projects (i.e., BRAC) that would affect water demand.

The programmatic groundwater assessment concluded that construction of the proposed levee would not adversely affect subsurface groundwater movement or the amount of groundwater available to riparian habitats beyond the levee. Thus, the riparian habitats south of the proposed levee would

retain their connection to the groundwater resources on which they depend. Therefore, under the assumed management of groundwater withdrawal, the proposed flood control improvement project would not be expected to contribute to cumulative impacts to groundwater levels and associated vegetation. Habitat monitoring would be conducted following construction of the levee which would ensure that adequate mitigation action is taken to compensate for all unanticipated cumulative impacts.

Base production well 105/05W-23501 would require abandoning following current State of California requirements and redrilled with a raised wellhead to be above the 100-year flood plain.

5.2.3 Traffic

The BRAC project would be the only project that would result in a long-term increase in traffic impacts due to the addition of 3,100 new personnel at MCAS Camp Pendleton. In conjunction with increases in short-term construction-related traffic from the Proposed Action and the other proposed projects (P-659, P-527, P-562, and the BRAC projects), Level of Service (LOS) may temporarily decline along Vandegrift Boulevard in the vicinity of MCAS Camp Pendleton and the Chappo (22) Area. However, traffic impacts would be reduced and LOS would return to acceptable levels after the completion of these projects some time between 1999 and the year 2000. All other projects would either be completed before the commencement of the Proposed Action (P-004 and P-347) or the construction schedule is unknown (PA303M and PA403R). Therefore, the Proposed Action would not result in a long term significant cumulative impact on traffic or circulation.

5.2.4 Noise

The BRAC project would be the only project that would have potential long-term effects on noise levels within the collective APE of all the proposed projects. However, in accordance with the AICUZ, there would be no adverse impacts to human receptors. Effects of the Proposed Action and projects P-659, P-527,and P-562 on noise are primarily short-term construction impacts. In conjunction with BRAC operations, there may be significant cumulative impacts of noise levels primarily to sensitive wildlife species. A study is currently underway to determine the extent and nature of noise impacts on the sensitive wildlife species in the project area. However, the short-term noise impacts would dissipate upon completion of the construction activities. Therefore, the Proposed Action would not contribute to significant cumulative noise impacts.

5.2.5 Air Quality

The Proposed Action and each of the other proposed projects (P-527, P-562, P-659, and BRAC) would all be in general conformity with the State Implementation Plan (SIP) of California for ozone

(O_3) and its precursors (volatile organic compounds [VOC] and nitrogen oxides [NO_x]). These are the only criteria pollutants that San Diego County Air Pollution Control District (SDCAPCD) is currently in serious non-attainment for National Ambient Air Quality Standards (NAAQS). At the peak of construction activities for all projects that would occur between late 1997 and mid-1998, none of the annual project emissions would exceed the *de minimis* threshold for VOC or NO_x of 50 tons per year. Therefore, short-term construction impacts from the Proposed Action would not contribute to cumulative air quality impacts.

Air emissions from diesel-powered pump operations at the pump station associated with the stormwater management system (P-010) would be well below the *de minimis* threshold for VOC and NO_x. The electrical pumps associated with P-010, the water wells (P-659), and the sewage effluent compliance project (P-527) would contribute indirectly to air quality impacts as a result of electrical power generation. The resulting contribution of emissions in the air basin would be within total projected emissions associated with the growth in power consumption, and are not expected to result in a significant cumulative impact. The BRAC activities would, however, generate higher operational emissions due to aircraft, aircraft equipment, motor vehicles, and living quarters. However, the estimated annual emissions for the BRAC Proposed Action were found to be substantially below the significance threshold level (U.S. Navy, 1996). Therefore, operations of the Proposed Action and the other proposed projects would not result in significant cumulative impacts to air quality. None of the proposed projects would contribute total annual emissions of more than 10 percent of the regional emissions in SDCAPCD. Therefore, there would be no cumulative impacts to regional air quality.

5.2.6 Aesthetics and Visual Resources

The Proposed Action has been assessed as having potential long-term significant impacts on the Santa Margarita River viewshed upstream from the existing Basilone Road bridge and the Santa Margarita Ranch House complex due to the proposed Rattlesnake Canyon Road alternative bridge alignment. This alternative alignment would introduce a new roadway and bridge into an otherwise natural vista dominated by riparian habitat. The proposed Airfield Lighting project (PA403R) would extend support poles with cross arms for light mountings approximately 1,500 feet beyond the runway. These lighting structures would contribute to a permanent visual impact to the upstream view of the river valley. In conjunction with the proposed Rattlesnake Canyon Road bridge alignment, if selected for the replacement of Basilone Road Bridge, the lighting project would result in a significant cumulative impact on visual resources in the project area. Pending the results of a visual effects analysis on the Santa Margarita Ranch House complex, none of the other proposed projects at MCB Camp Pendleton or MCAS Camp Pendleton would result in any significant cumulative impacts to aesthetics and visual resources.

5.2.7 Cultural Resources

The Preferred Alternative (3A) for P-010/P-030 and project P-527 would result in cumulative impacts to a National Register of Historic Places (NRHP)-eligible prehistoric site (CA-SDI-12628) located northeast of STP No. 3. Several intact deposits have been identified that would be directly impacted by both the proposed levee/floodwall and the pipeline for the proposed sewage effluent project. In addition, both projects would adversely affect an NRHP-eligible historic site (CA-SDI-14005H). This site includes segments of the historic California Southern Railway. Construction of the projects would result in direct impacts to different portions of this linear site. Preparation of a data recovery plan for project P-527 and preparation of a Memorandum of Agreement (MOA), a construction monitoring and discovery plan, and a data recovery and treatment plan for projects P-010 and P-030 would be implemented to reduce the overall impact on these sites. The appropriate level of data recovery for mitigation will be determined through consultation with the California State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP).

Even though NRHP Section 106 compliance (including data recovery) would be conducted for each project, an overall decrease of the frequency and types of sites in the region would decrease the available cultural resources base and create a significant cumulative adverse effect to this nonrenewable resource.

6.0 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OR RESOURCES

6.0 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

The National Environmental Policy Act (NEPA) requires an analysis of significant irreversible or irretrievable effects. Resources that are irreversibly or irretrievably committed to a project are those that are utilized on a long-term or permanent basis. These include the use of nonrenewable resources such as metal, wood, fuel, paper, and other natural or cultural resources. Human labor is also considered to be a nonrenewable resource. Another impact that falls under the category of the irreversible and irretrievable commitment of resources is the unavoidable destruction of natural resources that could limit the range of potential uses of a particular environment. Those resources which may be utilized for the Proposed Action are considered nonrenewable or irretrievable because they could have been utilized for other purposes.

Resources committed during construction of the P-010/P-030 project include the consumption of construction materials (rock, soils, and concrete), water, energy, capital, and human labor. Operation of the pump station would require energy. These nonrenewable resources would be considered irretrievable.

Although stormwater runoff would be temporarily detained on the south side of the levee, the runoff would be discharged back into the river via the pump station. The groundwater basin would be recharged from sources including natural percolation from the Santa Margarita river, artificial recharge of river water diverted into percolation ponds, and releases from Lake O'Neill (Leedshill-Herkenhoff, 1987). The commitment of these resources would not be considered irreversible.

The significant impacts from implementation of the Proposed Action described in Chapter 4 which cannot be avoided or reduced through mitigation measures to below the level of significance would be considered irreversible commitments of resources. This includes the direct permanent loss of riparian and coastal sage habitats, wetlands, and associated sensitive species (including threatened and endangered species); adverse effects on both historical and archaeological sites; and alteration of natural view sheds of the Santa Margarita River valley through the introduction of man-made structures.

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7.0 RELATIONSHIP BETWEEN SHORT-TERM USE OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

7.0 RELATIONSHIP BETWEEN SHORT-TERM USE OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The National Environmental Policy Act (NEPA) requires an environmental impact statement (EIS) to address the relation between short-term uses of the environment and the impact that such uses may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development option reduces future flexibility in pursuing other options, or that giving over a parcel of land or other resource to a certain use often eliminates the possibility of other uses being performed at that site.

Short-term effects from project construction would include impacts to air quality. Short-term impacts to air quality would result from increased fugitive dust (PM_{10}) emission. However, minor and short-term emissions would cease upon completion of construction, and would not hinder the attainment designation for ozone (O_3) and carbon monoxide (CO) in San Diego County. This negligible impact would be short-term and would not affect the long-term productivity of this resource.

A long-term loss of biological resources would occur from the construction of a levee and spur dikes/silt fences in sensitive habitat located within the river. A mitigation and monitoring program has been designed based upon consultation with the U.S. Fish and Wildlife Service. The impacts and compensatory mitigation would not interfere with the long-term productivity of the biological resources.

A long-term loss of cultural resources would occur because of construction of the levee and spur dikes/silt fences in portions of the river which have been identified as containing archaeological resources.

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8.0 REFERENCES

8.0 REFERENCES

Various individuals were contacted during the preparation of this Environmental Impact Statement (EIS) for information regarding current conditions at Marine Corps Base (MCB) Camp Pendleton; the proposed water wells and data; and general information. The individuals contacted are listed below.

8.1 PERSONS AND AGENCIES CONTACTED

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APPENDIX A

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NOTICE OF INTENT/RESPONSE LETTERS/ INTERGOVERNMENTAL COORDINATION - COOPERATING AGENCIES

UNITED STATES MARINE CORPS
MARINE CORPS BASE
BOX 555010
CAMP PENDLETON CALIFORNIA 92055-5010

IN REPLY REFER TO:
5090
BF2/30/10S

09 JAN 1996

Ladies and Gentlemen:

A Notice of Intent to prepare an Environmental Impact Statement for the Santa Margarita River Flood Control Project and the Basilone Road Bridge Replacement Project at Marine Corps Base, Camp Pendleton in San Diego County, California was published in the Federal Register on 9 January 1996. This letter serves to distribute the Notice of Intent to various federal, state, and local agencies, elected officials and special interest groups who may be interested in these projects.

The enclosed Notice of Intent provides the date and location of the public scoping meeting. This meeting will enable the public, interested and affected agencies and individuals to provide oral and written comments and concerns to the Marine Corps.

You may also forward comments by 10 March 1996 to Ms. Melanie Ault at the following address:

Department of the Navy
Southwest Division
Naval Facilities Engineering Command
1220 Pacific Highway
San Diego, CA 92132-5190
Attn: Code 232.MA

Sincerely,

W. A. SPENCER
Colonel, U.S. Marine Corps
Assistant Chief of Staff,
Facilities
By direction of
the Commanding General

Encl:
(1) Public Notice

Billing Code 3810-FF-P

DEPARTMENT OF DEFENSE

Department of the Navy

NOTICE OF INTENT TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT FOR CONSTRUCTION OF FLOOD PROTECTION FACILITIES ALONG THE SANTA MARGARITA RIVER AND REPLACEMENT OF THE BASILONE ROAD BRIDGE AT MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA

Pursuant to the National Environmental Policy Act as implemented by the Council on Environmental Quality regulations (40 CFR Parts 1500-1508), the U.S. Marine Corps intends to prepare an Environmental Impact Statement (EIS) to evaluate the environmental effects of construction of flood protection facilities and replacement of the Basilone Road Bridge at Marine Corps Base (MCB) Camp Pendleton. During the winter of 1993, heavy rains and stormwater runoff resulted in the Santa Margarita River flooding facilities at MCB Camp Pendleton, including Marine Corps Air Station (MCAS) Camp Pendleton. The flood also destroyed the Basilone Road Bridge, a transportation corridor which spans the Santa Margarita River.

The proposed action involves construction of a levee and stormwater control measures to prevent flooding from the Santa Margarita River damaging facilities at MCB/MCAS Camp Pendleton, and construction of a new two-lane bridge to replace the bridge destroyed by the flood.

Alternatives to be addressed in the EIS will focus on methods of implementing flood protection measures, including different levee alignments; alternative stormwater control facilities, including a detention basin location and a concrete lined flood control channel; and alternative alignments of the Basilone Road Bridge.

Major environmental issues that will be addressed in the EIS include air quality, water quality, traffic, utilities, endangered species and cultural resources.

The Marine Corps will initiate a scoping process for the purpose of determining the extent of issues to be addressed and identifying the significant issues related to this action. The Marine Corps will hold a public scoping meeting on January 25, 1996, beginning at 4:00 pm, at the San Rafael Elementary School, 1616 San Rafael Drive, Oceanside, CA. This meeting will be advertised in area newspapers.

A brief presentation will precede request for public comment. Marine Corps representatives will be available at this meeting to receive comments from the public regarding issues of concern to the public. It is important that federal, state, and local agencies and interested individuals take this opportunity to identify environmental concerns that should be addressed during the preparation of the EIS. In the interest of available time, each speaker will be asked to limit their oral comments to five minutes.

Agencies and the public are also invited and encouraged to provide written comment on scoping issues in addition to, or in lieu of, oral comments at the public meeting. To be most helpful, scoping comments should clearly describe specific issues or topics which the commentor believes the EIS should address. Written statements and or questions regarding the scoping process should be mailed to: Commanding Officer, Southwest Division, Naval Facilities Engineering Command, 1220 Pacific Coast Highway, San Diego, CA 92132-5187, (Attn: Ms. Melanie Ault, Code 232MA), phone number (619) 532-3355. All comments must be received no later than February 12, 1996.

1/3/96
Date

KIM G. WEIRICK
Acting Head, Land Use and
Military Construction Branch
Facilities and Services Division
Installations and Logistics Department
By direction of the Commandant
of the Marine Corps

NOTICE OF PUBLIC SCOPING MEETING

MARINE CORPS BASE - CAMP PENDLETON
U.S. NAVY - SOUTHWEST DIVISION

PROJECT:

The project to be considered in an Environmental Impact Statement (EIS) is the proposed Santa Margarita River Flood Control Project and Basilone Bridge Road Replacement on Marine Corps Base - Camp Pendleton. The EIS will address a full range of alternative flood control structures and the No Action alternatives. Two levee alignment alternatives and the No Action alternative will be evaluated for the Santa Margarita River Flood Control Project in the EIS. Three Basilone Road Bridge alignment alternatives and the No Action alternative will be evaluated for the Basilone Road Bridge Replacement in the EIS.

WHAT:

An open-forum Public Scoping Meeting for the Santa Margarita River Flood Control Project and Basilone Road Bridge Replacement EIS is scheduled for Thursday, January 25, 1996. Interested parties are invited to drop-in any time between 4:00 and 7:00 p.m. to obtain project information and provide either oral or written comments. This open- forum meeting will not include a formal presentation; however, handouts and exhibits explaining the proposed project and the scoping process will be available. Staff and personnel from the Marine Corps Base - Camp Pendleton and the U.S. Navy - Southwest Division will be available to answer questions on an individual basis.

WHEN AND WHERE:

Thursday, January 25, 1996
4:00 - 7:00 p.m.
San Rafael Elementary School - Cafeteria
1616 San Rafael Drive
Oceanside, California 92054

WHY:

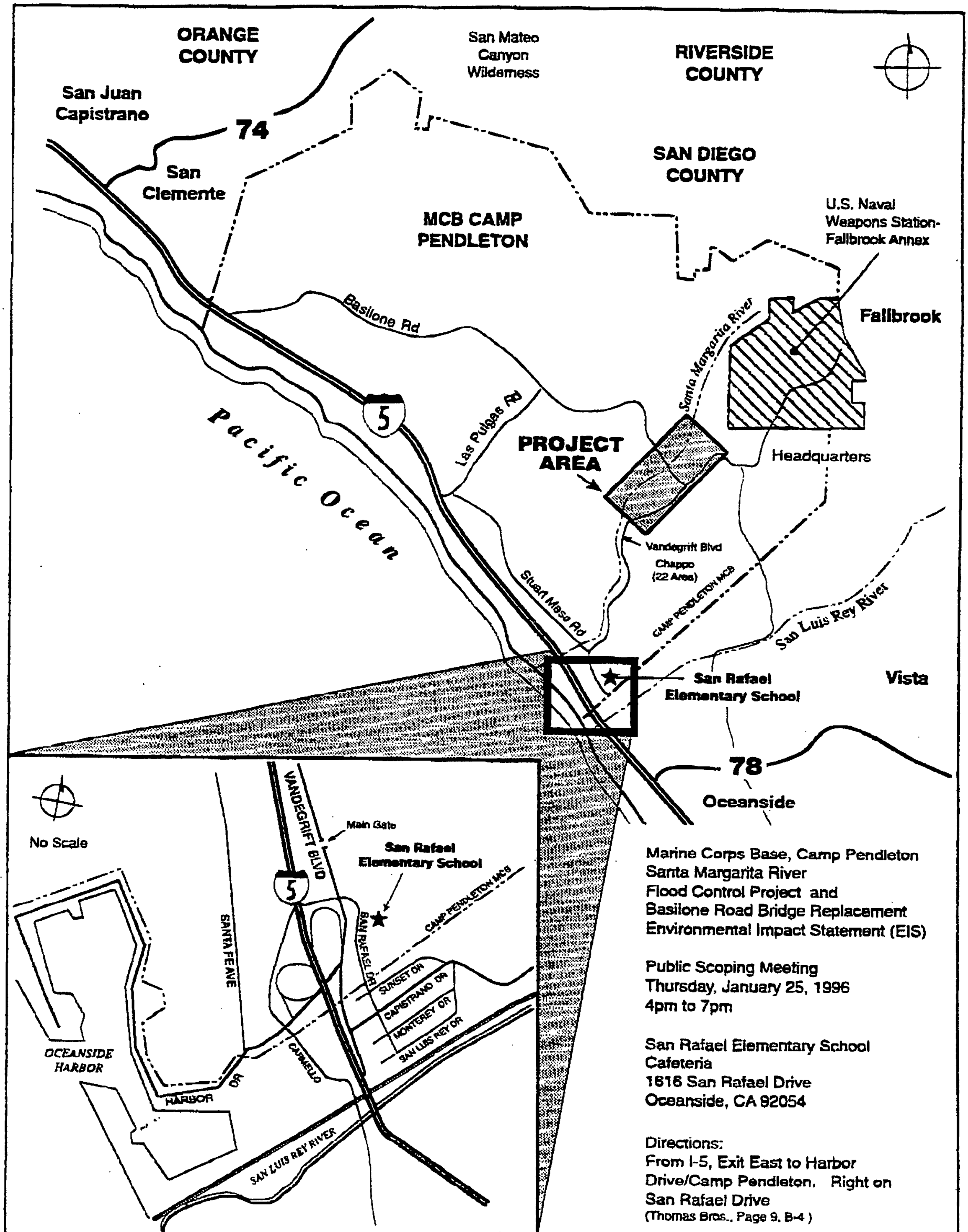
The public scoping process is designed to provide interested individuals with the opportunity to identify significant environmental issues which should be considered in the Environmental Impact Statement (EIS).

If you wish to submit written comments, please mail no later than March 10, 1996. Comments should be addressed to:

Department of the Navy
Southwest Division
Naval Facilities Engineering Command
1220 Pacific Highway
San Diego, CA 92132-5190

Attn: Ms. Melanie Ault - Code 232MA

Map to Public Scoping Meeting.



Marine Corps Base, Camp Pendleton
Santa Margarita River
Flood Control Project and
Basilone Road Bridge Replacement
Environmental Impact Statement (EIS)

Public Scoping Meeting
Thursday, January 25, 1996
4pm to 7pm

San Rafael Elementary School
Cafeteria
1616 San Rafael Drive
Oceanside, CA 92054

Directions:
From I-5, Exit East to Harbor Drive/Camp Pendleton. Right on San Rafael Drive
(Thomas Bros., Page 9, B-4)

PUBLIC SCOPING MEETING INFORMATION
FOR THE
SANTA MARGARITA RIVER FLOOD CONTROL PROJECT
AND BASILONE ROAD BRIDGE REPLACEMENT
ENVIRONMENTAL IMPACT STATEMENT
TO BE PREPARED BY THE
MARINE CORPS BASE - CAMP PENDLETON
AND THE U.S. NAVY - SOUTHWEST DIVISION

WHAT IS THE SCOPING PROCESS?

The scoping process is a mechanism whereby input is solicited from the community and responsible agencies to help identify and clarify the range of actions, alternatives, concerns, and environmental issues that will be addressed in an Environmental Impact Statement (EIS). The scoping process has been found to be an effective way to stimulate discussion and identify the concerns of the community within which a project is located, as well as the concerns of permitting regulatory agencies and other interested parties. Because the scoping process occurs in the initial stages of a project, the full extent of potential environmental impacts due to the proposed projects have not yet been evaluated and are not known. Therefore, answers to questions raised by the public are not always available.

WHY IS THE PROJECT NEEDED?

The purpose of the Santa Margarita River Flood Control Project is to protect the existing Marine Corps Base - Camp Pendleton facilities and operations adjacent to the Santa Margarita River including the Marine Corps Air Station (MCAS), Camp Pendleton Area 22 facilities, sewage treatment facilities, and the historic Ranch House. The flooding of the Santa Margarita River in January 1993 destroyed an earthen berm protecting these facilities. The Flood Control Project would replace an existing, temporary earthen berm constructed after the 1993 flood. The Flood Control Project has two components: Component A consists of a levee structure and Component B consists of stormwater control measures.

The purpose of the Basilone Road Bridge Replacement is to provide north/south transportation access across the Santa Margarita River. Basilone Road Bridge was destroyed during the 1993 flood. The need for the Basilone Road Bridge is to replace a destroyed transportation route/temporary road bridge with a permanent structure which meets engineering criteria to ensure safety and longevity.

WHAT IS BEING PROPOSED?

The EIS, which is being prepared pursuant to the National Environmental Policy Act (NEPA), will address the environmental impacts associated with the Santa Margarita River Flood Control Project and the Basilone Road Bridge Replacement.

The proposed project consists of the construction of a flood control levee within the Santa Margarita River basin adjacent to the Marine Corps Air Station on Camp Pendleton. The levee will provide protection against a 100-year flood event. Overall length of the levee is approximately 16,600 linear feet. The levee height will range between twelve and twenty feet; the top of the levee width will be sixteen feet and the bottom width ranges between 40 to 60 feet. A pump station is proposed to pump stormwater run-off which drains from Camp Pendleton Areas 22 and 13 over the levee during periods of high water.

The Basilone Road Bridge is to replace a temporary bridge which crosses the Santa Margarita River. The original Basilone Road Bridge was destroyed by flooding in January 1993.

WHAT ALTERNATIVES ARE BEING CONSIDERED IN THE EIS?

The EIS will evaluate a number of potential alternatives. The primary alternatives under consideration are the No Action alternative. two levee alignment alternatives, and three Basilone Bridge Replacement alternatives. The attached maps depict these alternatives.

WHAT ISSUES ARE PROPOSED TO BE DISCUSSED IN THE EIS?

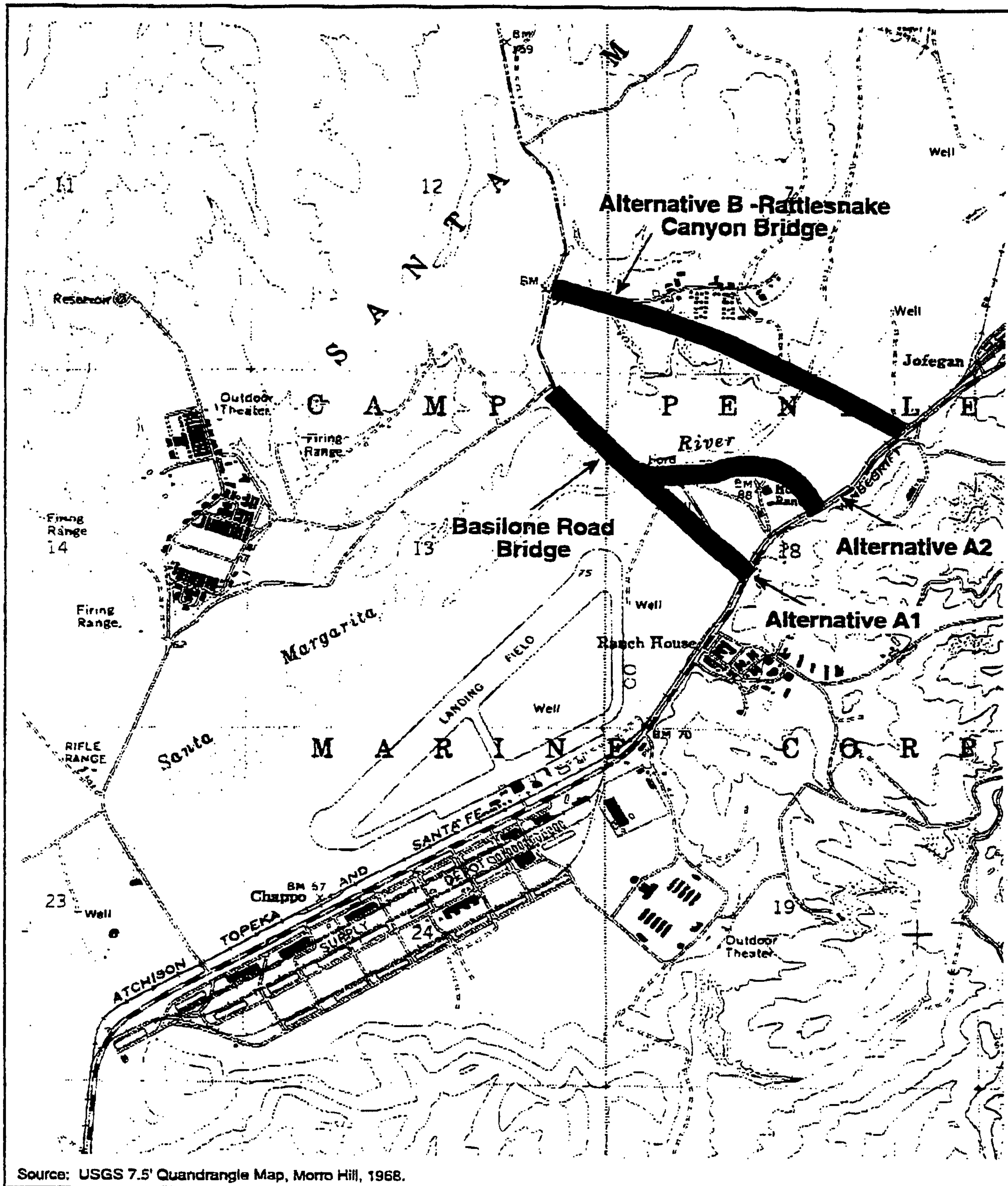
The EIS will address the following issues: geology, hydrology, air quality, biology, land use, socioeconomics, traffic, noise, aesthetics, and cultural resources.

WHO ARE THE KEY PLAYERS IN THE EIS?

The Department of the Navy for the Marine Corps Base - Camp Pendleton will serve as the lead agency for the EIS.

WHAT ARE MY OPPORTUNITIES FOR INPUT INTO THE PROCESS?

Opportunities for public involvement occur throughout the environmental review process. This scoping meeting provides an opportunity for early input on the scope of the EIS. Regulatory agency coordination with the public is anticipated through an active public participation program. The Draft EIS will be distributed for a 45-day review period during which comments from the public will be solicited. All substantive comments on the adequacy of the environmental document will be responded to in writing and addressed in the Final EIS. The EIS process is expected to take approximately two years to complete.



Source: USGS 7.5' Quandrangle Map, Morro Hill, 1968.

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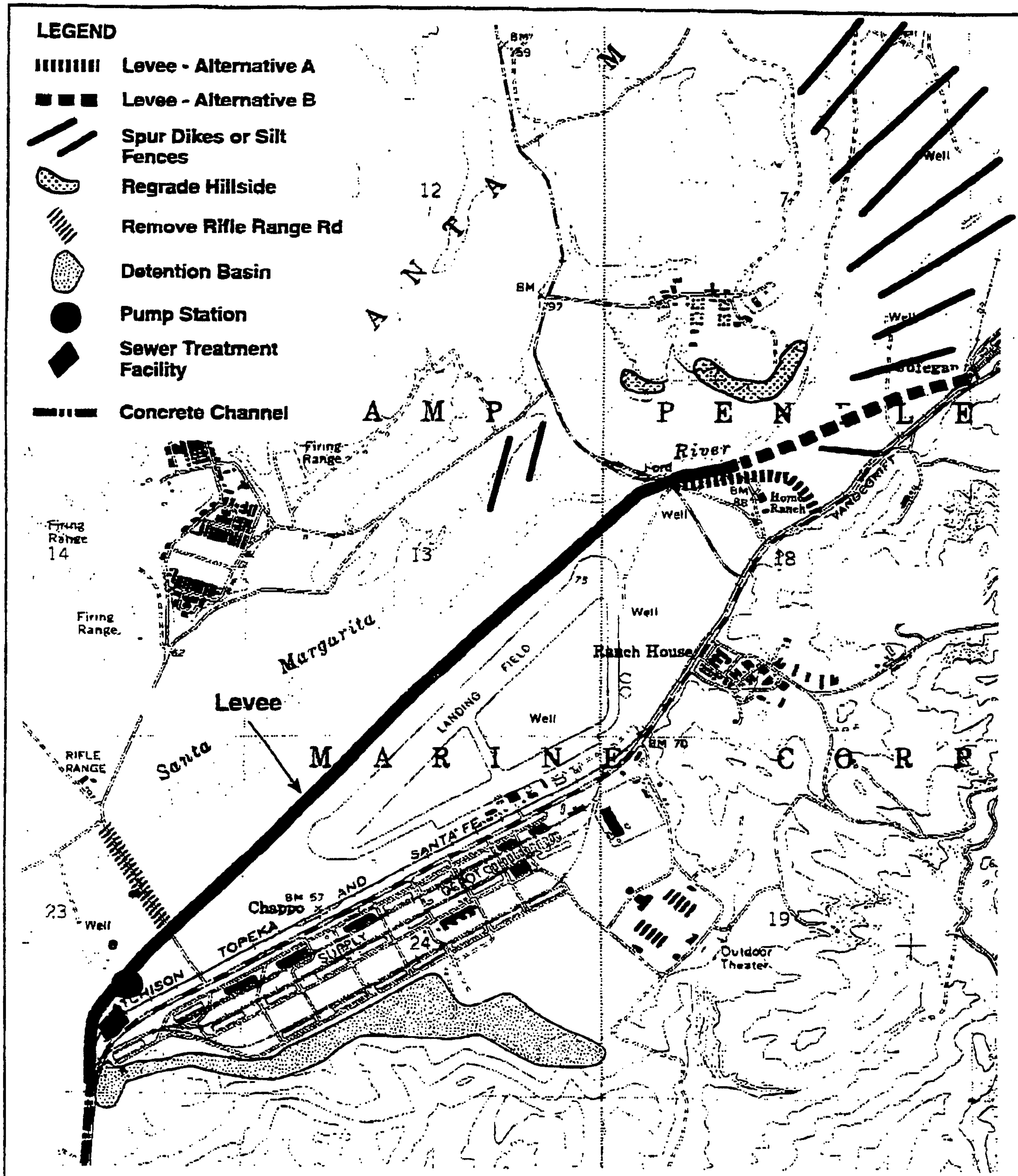
Basilone Road Bridge Replacement Alternatives



Source: USGS 7.5' Quandrangle Map, Morro Hill, 1968.

Santa Margarita River Flood Control Project
Alternative Components

APPENDIX B

APPENDIX B

SELECTION CRITERIA

APPENDIX B

A planning and evaluation screening process was conducted by the MCB Camp Pendleton and MCAS Camp Pendleton to identify feasible alternatives for meeting the purpose and need of the Proposed Action. The initial phase of the evaluation process included an engineering feasibility study conducted by the U.S. Army Corps of Engineers (ACOE) (Simons Li & Associates, 1995). This evaluation and other studies identified onbase and offbase flood control alternatives and Basilone Road Bridge replacement alternatives. The onbase flood control alternatives included a concrete lined channel, a soft bottom channel, a floodwall/levee, and an onbase detention dam. Construction of an offbase detention dam/De Luz Creek Reservoir had previously been evaluated (Leedshill-Herkenshoff, 1989).

MCB Camp Pendleton and MCAS Camp Pendleton reviewed the findings of the ACOE study and reviewed the previous studies for the offbase De Luz Creek Reservoir. The screening process included evaluating engineering feasibility (hydraulic control, sediment control, channel maintenance, and channel width); MCB Camp Pendleton and MCAS Camp Pendleton operations and mission feasibility (providing flood control to MCB Camp Pendleton and MCAS Camp Pendleton as expeditiously as possible, and avoiding flight pattern intrusion); and environmental feasibility (potential impacts on water resources and biological resources). It was determined that the most feasible alternative to meet the purpose and need for MCB Camp Pendleton and MCAS Camp Pendleton was to construct a levee and associated stormwater management system and replace Basilone Road Bridge. The other alternatives were eliminated during the screening process.

Subsequent to this screening process, MCB Camp Pendleton and MCAS Camp Pendleton conducted an additional review referred to as value engineering. A team of engineers, environmental scientists, and cost specialists were assembled to review the assumptions used in the screening and pre-engineering process (Value Engineering Team Study, August 1995). From this value engineering process, refinements were proposed to the levee and stormwater management components. Additionally, Rattlesnake Canyon Road was identified as an alternative which should be evaluated further for the replacement of Basilone Road Bridge. With this alternative, a new crossing of the Santa Margarita River would be constructed just west of the existing Rattlesnake Canyon Road/Vandegrift Boulevard intersection.

Selection Criteria - **Santa Margarita River Flood Control Project (P-010)**
Component A - Flood Control Improvement

The selection criteria for the Flood Control Improvement, a component of the Santa Margarita River Flood Control Project (P-010) were as follows:

Criterion 1A: Engineering Feasibility - Hydraulic Control
Criterion 1B: Engineering Feasibility - Sediment Control
Criterion 1C: Engineering Feasibility - Channel Maintenance

Criterion 1D: Engineering Feasibility - Channel Width
Criterion 2A: Operations - MCB Camp Pendleton/MCAS Camp Pendleton Mission
Criterion 2B: Operations - MCAS Flight Pattern Intrusion
Criterion 2C: Operations - Timeliness
Criterion 3A: Environmental Impacts - Water Resources
Criterion 3B: Environmental Impacts - Biological Resources

Engineering Feasibility. The ACOE floodplain analysis of the Lower Santa Margarita River (Simons, Li & Associates, 1995) evaluated flood control improvement alternatives for the lower reaches of the Santa Margarita River. The floodplain analysis study area began at the river outlet at the Pacific Ocean and extended upstream to the confluence of the Santa Margarita and De Luz Rivers.

Four criteria were used to evaluate the engineering feasibility of the alternatives.

- **Criterion 1A - Hydraulic Control:** Does the project provide adequate hydraulic control measures?

  A feasible project will protect the facilities, equipment and operations at MCAS Camp Pendleton, the Chappo (22) Area, Sewage Treatment Plant No. 3, and the historic Santa Margarita Ranch House from inundation at a 1 in 100 year recurrence interval event. The proposed flood protection facilities will be able to sustain the depths, flows and velocities associated with the 1 in 100 year recurrence interval event.

- **Criterion 1B - Sediment Control:** Does the project provide adequate sediment control and scouring measures?

  A feasible project will result in minimal channel maintenance (vegetation clearing and dredging) to maintain the hydraulic capacity of the Santa Margarita River. A feasible project will manage the scouring effects of high velocity flows without jeopardizing structures or land forms. A feasible project will incorporate "resilient" sediment control and river training features that can accommodate a range of river flows and sediment loads.

- **Criterion 1C - Channel Maintenance:** Does the project minimize the requirements for channel maintenance?

  A feasible project would minimize channel maintenance measures, including sediment removal and erosion control. The project would reduce the requirements for frequent

channel maintenance and increase the reliance on natural scouring features to balance sediment buildup and erosion. The project would reduce the reliance on manual channel maintenance measures (i.e., annual desilting) to prevent the inundation of structures which support MCB Camp Pendleton and MCAS Camp Pendleton facilities, equipment, and operations.

- **Criterion 1D - Channel Width:** Does the project minimize the river channel width to provide a primary transportation crossing of the Santa Margarita River?

  A feasible project would minimize the river channel width to be spanned by a bridge for Basilone Road, which is a primary transportation crossing of the Santa Margarita River for MCB Camp Pendleton and MCAS Camp Pendleton operations. A minimum channel width is required to maintain adequate water flow depth and water flow velocity in the river. The existing bridge span is located downstream of a major bend and choke in the river. The existing bridge structure, and in particular, the roadway approaches, intensify the choking effect. The Basilone Road Bridge span must provide adequate clearance above the river to prevent debris from affecting water flow depth velocity. Wide bridge spans have high costs for construction and maintenance. The project would minimize the required length of the bridge span to reduce costs, while still maintaining adequate clearance for the river during a 100-year flood event.

MCB Camp Pendleton and MCAS Camp Pendleton Operations. The alternatives for the flood control project must not conflict with MCB Camp Pendleton and MCAS Camp Pendleton structures in Chappo (22) Area, STP No. 3, and Santa Margarita Ranch House complex. Two criteria were used.

- **Criterion 2A:** Does the project protect the facilities and equipment at MCB Camp Pendleton and MCAS Camp Pendleton during a 100-year flood event?

  A feasible project would protect and prevent damage to MCB Camp Pendleton and MCAS Camp Pendleton facilities and equipment from flooding. The project would protect the MCAS Camp Pendleton facilities, including the runway, parking aprons, military aircraft, aircraft maintenance areas, and administration areas.

- **Criterion 2B**: Does the project minimize conflicts with MCAS Camp Pendleton aircraft operations?

  A feasible project would minimize intrusion into the existing military aircraft approach-departure clearance zones and accident potential zones (APZ). The project would

minimize the height of the flood control project and any associated structures to prevent intrusion into the Type I clear zones for the MCAS Camp Pendleton runway.

- **Criterion 2C:** Does the project provide protection of MCB Camp Pendleton and MCAS Camp Pendleton operations, facilities, and equipment in a timely manner?

  A feasible project could be completed in a timely manner and would minimize procedures that could delay implementation of flood protect.

Environmental Impacts. Environmental considerations were factored into the selection process. Considering the purpose and need of the project, a flood control project cannot be implemented without some environmental effects. These effects could be minimized through alternatives selection and incorporating mitigation into the project design. Two environmental impacts criteria were used.

- **Criterion 3A**: Does the project minimize impacts to surface water/hydrology and water resources in the Lower Santa Margarita River Basin?

  A feasible project would minimize impacts to the water resources in the Lower Santa Margarita River Basin and allow groundwater recharge from surface water percolation. The entire water supply for MCB Camp Pendleton and MCAS Camp Pendleton is extracted by water wells from groundwater basins, including the Lower Santa Margarita River Basin which provides from 60 to 70 percent of the total water supply. The recharge of the groundwater aquifers is dependent upon percolation from surface waters.

- **Criterion 3B**: Does the project minimize impacts to biological resources?

  A feasible project would be constructed in an area which avoids or minimizes impacts to biological resources, including endangered/threatened/sensitive species and related sensitive habitat.

Selection Criteria - Santa Margarita River Flood Control Project (P-010) Component B - Stormwater Management System

The selection criteria for the Stormwater Management System, a component of the Santa Margarita River Flood Control Project (P-010), were as follows:

Criteria 1: Engineering Feasibility - Hydraulic Control
Criteria 2: Operations - MCB Camp Pendleton/MCAS Camp Pendleton Mission

Criteria 3A: Environmental Impacts - Biological Resources
Criteria 3B: Environmental Impacts - Hazardous Materials/Environmental Health

Engineering Feasibility. The project design engineers prepared a description of alternatives for a stormwater management system which would detain and then drain surface water runoff that is trapped behind the flood control improvement. The stormwater management system would collect and discharge runoff from 2,094 acres (3.27 square miles), including the MCAS Camp Pendleton and the Chappo (22) Area. The stormwater management system would have the capacity for a 100-year flood event with a duration of 24 hours; the total flow required to be managed through the system is 1,478 cfs. One engineering criterion was used.

- **Criterion 1**: Does the project provide hydraulic control of peak surface water runoff?

  A feasible project would collect, detain, and discharge surface water runoff during a combined flood/storm event in the MCAS Camp Pendleton and Chappo (22) Area drainage basins. The project would provide a stormwater management system to convey and discharge stormwater into the Santa Margarita River and to prevent flooding of the MCAS and the Chappo (22) Area.

MCB Camp Pendleton and MCAS Camp Pendleton Operations. The project must not conflict with MCB Camp Pendleton or MCAS Camp Pendleton operations and the fulfillment of the base mission. One criterion was identified.

- **Criterion 2**: Does the project support the operations conducted to achieve the MCB Camp Pendleton/MCAS Camp Pendleton missions?

  A feasible project would minimize siting conflicts with existing MCB Camp Pendleton/MCAS Camp Pendleton operations. The project would provide surface water runoff drainage for the MCAS Camp Pendleton and Chappo (22) Area drainage basins to prevent flooding of MCB Camp Pendleton and MCAS Camp Pendleton facilities.

Environmental Impacts. Environmental considerations were factored into the selection process. Considering the purpose and need of the project, a stormwater management system cannot be implemented without some environmental effects. These effects could be minimized through alternatives selection and incorporating mitigation into the project design. One environmental criterion was used.

- **Criterion 3A**: Does the project minimize impacts to biological resources?

  A feasible project would be constructed in an area which avoids or minimizes impacts to biological resources including endangered/threatened/sensitive species and related sensitive habitat. The project would be sited to avoid or minimize impacts to biological resources from the construction, operation, and maintenance of stormwater detention or discharge components.

- **Criterion 3B:** Does the project minimize impacts from hazardous materials to human health and safety:

  A feasible project would be constructed in an area which avoids soil and groundwater contamination identified in MCB Camp Pendleton Installation Restoration sites. The project would avoid construction and operation impacts which would contribute to the migration of groundwater contamination.

Selection Criteria **- Basilone Road Bridge Replacement (P-030)**

The selection criteria for the Basilone Road Bridge Replacement (P-030) were as follows:

Criterion 1:	Engineering Feasibility - Bridge Span/Channel Width
Criterion 2A:	Operations - MCB Camp Pendleton/MCAS Camp Pendleton Mission
Criterion 2B:	Operations - MCAS Camp Pendleton Flight Pattern Intrusion
Criterion 3:	Environmental Impacts - Biological Resources

Engineering Feasibility. The ACOE floodplain analysis of the Lower Santa Margarita River (Simons, Li & Associates, 1995) evaluated the effects of improvements to the existing Basilone Road related to hydraulic and debris control in the Santa Margarita River. The existing Basilone Road Bridge span is located downstream of a major bend and choke in the river. The existing bridge structure, and in particular, the roadway approaches, intensify the choking effect. The ACOE floodplain analysis indicated that an improved bridge configuration that minimizes the additional choking effect at the Basilone Road location would enhance the safety of the existing levee. The existing river narrows to a width of approximately 1,000 feet at the Ranch House peninsula. Without upstream improvements, a bridge span of 1,000 feet would be required to avoid additional choking effect (ACOE, *Floodplain Analysis Report - Lower Santa Margarita River*, 1995).

The bridge replacement would depend on the flood control project selected to improve Reach 12 which includes the Basilone Road Bridge crossing. The flood control project alternatives have widely differing requirements for channel dimensions at the location of the existing bridge crossing.

The bridge replacement project should be viewed as a component of the flood control project. The bridge replacement project must be compatible with the flood control project to ensure that the bridge does not create a local disruption in the sediment conveyance characteristics of the improved project reach, wherever implemented along the river (ACOE, *Floodplain Analysis Report - Lower Santa Margarita River*, 1995).

- **Criterion 1**: Does the project location minimize the channel width of the Santa Margarita River to provide bridge and roadway approaches which do not create a hydraulic impediment to water flow?

  A feasible project would construct and maintain a bridge and roadway approaches at a location which would reduce the choking effect and would not create hydraulic impediments to water flow. A minimum river channel width is required to maintain adequate water flow depth and water flow velocity. Debris buildup on the bridge piers reduces the conveyance capacity of the bridge sections, which tends to back up the water upstream while increasing the local scour potential around the bridge piers. The project would provide pier diversions and pier streamlining to channel debris flow under the bridge without buildup. The bridge replacement must provide adequate clearance above the river to prevent debris buildup from affecting flow depth and flow velocity.

MCB Camp Pendleton and MCAS Camp Pendleton Operations. The project must not conflict with MCB Camp Pendleton or MCAS Camp Pendleton operations and the fulfillment of the base mission. Two criteria were used.

- **Criterion 2A**: Does the project support the operations conducted to achieve the MCB Camp Pendleton and MCAS Camp Pendleton missions?

  A feasible project would minimize conflicts with existing MCB Camp Pendleton/MCAS Camp Pendleton military training activities. The project would support the MCB Camp Pendleton/MCAS Camp Pendleton operations by providing a primary north-south road crossing the Santa Margarita River. A primary north-south river crossing is required to expedite the transport of MCB Camp Pendleton/MCAS Camp Pendleton personnel, vehicles, and equipment which support the MCB Camp Pendleton/MCAS Camp Pendleton missions. The only other bridge crossings of the Santa Margarita River are at Interstate 5 and Stuart Mesa Road, located approximately 6 miles to the west of Basilone Road.

- **Criterion 2B**: Does the project minimize conflicts with MCAS Camp Pendleton aircraft operations?

    A feasible project would minimize intrusion into the existing military aircraft approach/departure zones and accident potential zones (APZ). The project would minimize the height of the bridge replacement over a flood control project to prevent intrusion into a clear zone delineated by the Air Installation Compatible Use Zone (AICUZ) program for the MCAS Camp Pendleton. *The project would minimize the intrusion of traffic utilizing Basilone Road, especially high-profile MCB Camp Pendleton and MCAS Camp Pendleton vehicles and equipment, into the aircraft approach/departure zones.*

Environmental Impacts. Environmental considerations were factored into the selection process. Considering the purpose and need of the project, a bridge span across the river cannot be implemented without some environmental effects. These effects could be minimized through alternatives selection and incorporating mitigation into the bridge and roadway design. One environmental criterion was used.

- **Criterion 3**: Does the project minimize impacts to biological resources?

    A feasible project would be constructed in an area which avoids or minimizes impacts to biological resources, including endangered/threatened/sensitive species and related sensitive habitat. The project would be sited to avoid or minimize impacts to biological resources from the construction and maintenance of the bridge and roadways.

APPENDIX C

APPENDIX C

ALTERNATIVE SCREENING ANALYSIS

APPENDIX C

ALTERNATIVES CONSIDERED

Based on the MCB Camp Pendleton/MCAS Camp Pendleton planning process and the application of selection criteria described at the beginning of this section, alternatives for the Proposed Action and the No Action Alternative were identified and evaluated. The following is a description of each alternative for the Proposed Action that was considered, a summary of the criteria evaluation, and the results of the criteria evaluation.

Santa Margarita River Flood Control Project (P-010) - Flood Control Improvement

Alternatives to the Proposed Action which would fulfill the purpose and need were developed by MCB Camp Pendleton/MCAS Camp Pendleton. The alternatives for the flood control project were evaluated by the ACOE floodplain analysis and the Value Engineering Team Study. Based on these studies, the alternatives were evaluated using the following selection criteria:

Criterion 1A: Engineering Feasibility - Hydraulic Control
Criterion 1B: Engineering Feasibility - Sediment Control
Criterion 1C: Engineering Feasibility - Channel Maintenance
Criterion 1D: Engineering Feasibility - Channel Width
Criterion 2A: Operations - MCB Camp Pendleton/MCAS Camp Pendleton Mission
Criterion 2B: Operations - MCAS Flight Pattern Intrusion
Criterion 2C: Operations - Timeliness
Criterion 3A: Environmental Impacts - Water Resources
Criterion 3B: Environmental Impacts - Biological Resources

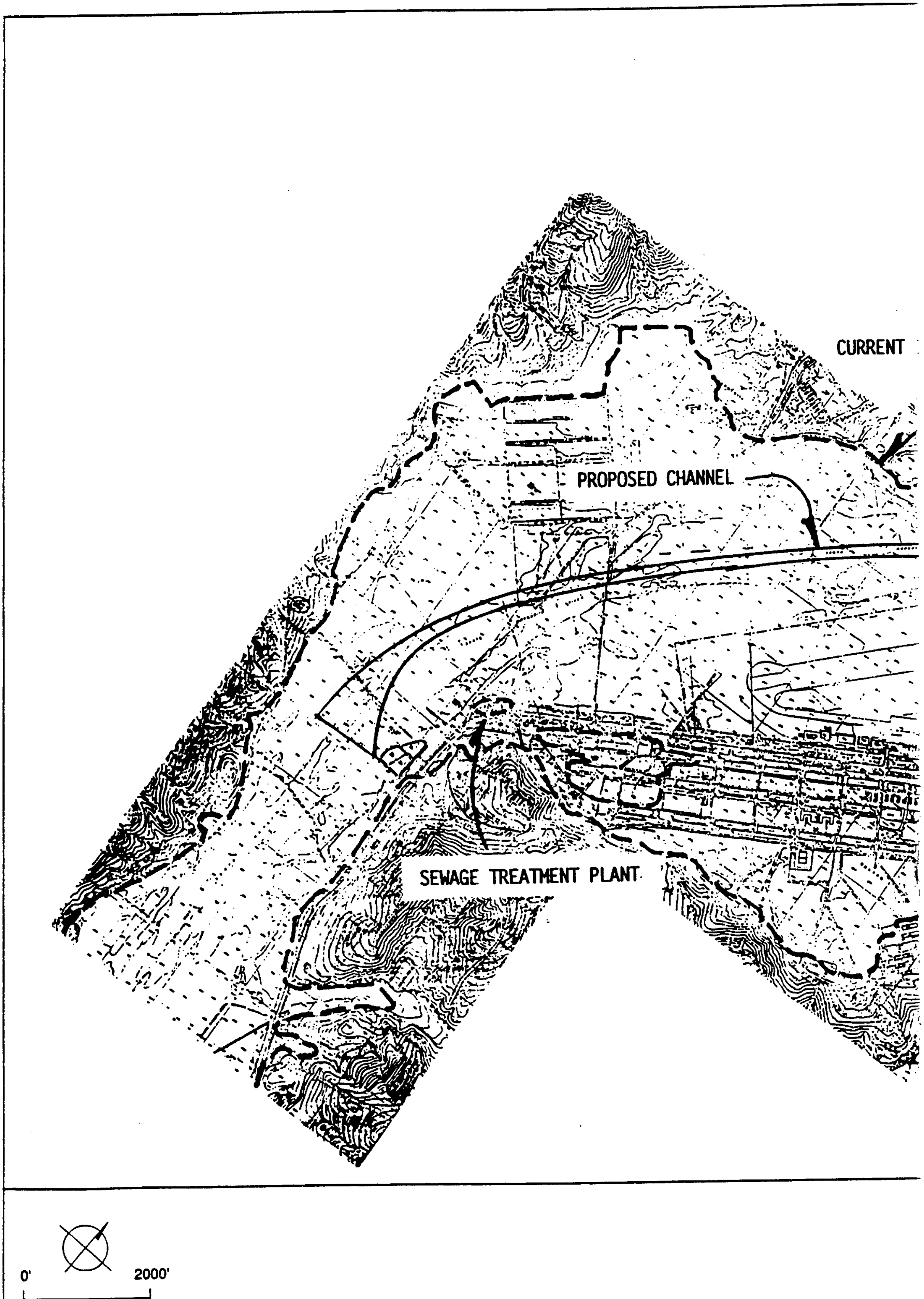
The following is a description of each alternative, the analysis of selection criteria, and the results of the criteria evaluation. The criteria evaluation includes the primary reasons an alternative was eliminated or retained for further consideration. Table 2.5-1 provides a qualitative comparison of the alternatives for the Santa Margarita River Flood Control Project (P-010). Five alternatives were eliminated from further consideration. One alternative for the Proposed Action and the No Action Alternative were retained for further analysis in this EIS.

Concrete Lined Channel. A concrete lined channel to control water depth and flow velocity was evaluated based on the selection criteria (Figures C-1 and C-2). The channel would be constructed with three potential lining materials: 1) a thin shell of minimally reinforced concrete with 2:1 side slopes; 2) a thick walled channel constructed of soil cement with 1:1 side slopes; or 3) an Armorflex-lined channel with 2:1 side slopes. Armorflex lining consists of articulating concrete blocks which allow drainage between the subsurface and the channel face. A range of channel bottom widths were evaluated assuming normal water depth and allowing 2.5 feet of freeboard clearance above the 100-year floodplain. The thin shell concrete channel and soil cement channel would not allow free drainage or percolation of surface water. The lining material would vary from 8 inches thick with the thin concrete shell to 2 feet thick with the soil cement alternative.

Using the three variations for the lined channel, the 100-year hydraulic characteristics and the estimated lining volume of the constructed channel were investigated to determine the water flow depths and flow velocities related to channel performance and construction costs. The results of this investigation indicated that the optimal lined channel would be a soil cement channel with a bottom width of 105 feet, a future 100-year flow depth of 23.3 feet, and flow velocity of 21.4 feet per second. The lined channel would require 95 acres for structures and flood control components.

Analysis of Siting Criteria. The concrete lined channel would provide reliable, predictable, and durable hydraulic control measures with a soil cement lining and a 105-foot wide bottom (Criterion 1A). The lined channel would provide an efficient and safe means of flood containment, water flow, and sediment transport (Criterion 1B). The lined channel would require minimum maintenance (Criterion 1C) and would minimize the channel width to 160 feet (Criterion 1D). The lined channel would protect the operations of MCB Camp Pendleton/MCAS Camp Pendleton (Criterion 2A). The south wall of the lined channel would require the raising of the Basilone Road Bridge crossing, thereby resulting in the intrusion of high-profile vehicles into the MCAS Camp Pendleton Approach-Departure Clearance Surface (Criterion 2B). The permitting and construction of the concrete lined channel would be lengthy and would prevent the timely development of protection for MCB Camp Pendleton/MCAS Camp Pendleton operations (Criterion 2C).

The lined channel would restrict the free drainage/percolation of surface water. This would prevent percolation of water required to recharge groundwater aquifers (Criterion 3A). The lined channel would require the complete excavation of the river bottom, which would remove biological resources, including riparian habitat and endangered/threatened/sensitive species for a 105-foot-wide lining. The soil cement lining would prevent the establishment of riparian habitat (Criterion 3B).


CURRENT
PROPOSED CHANNEL
SEWAGE TREATMENT PLANT
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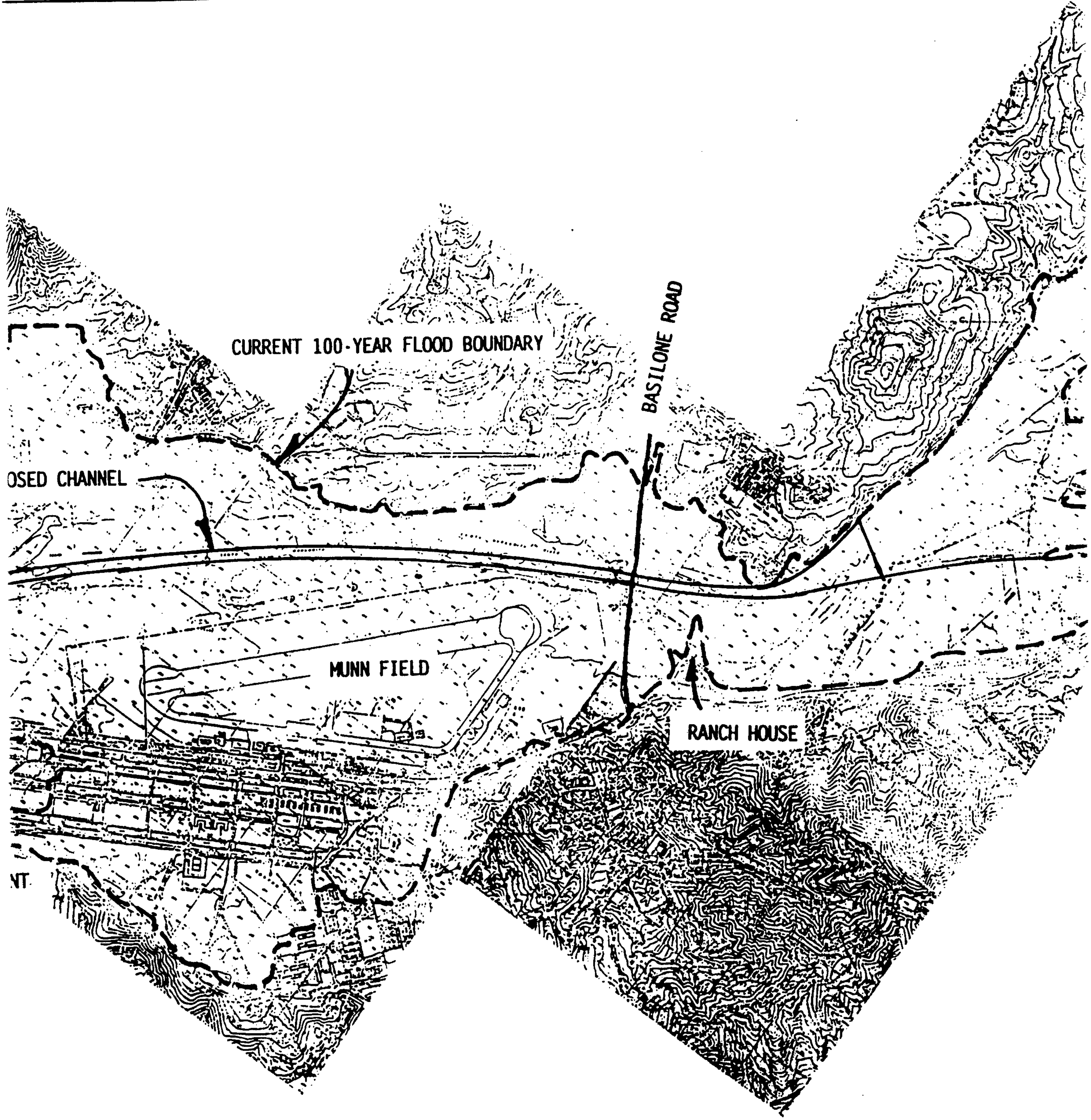
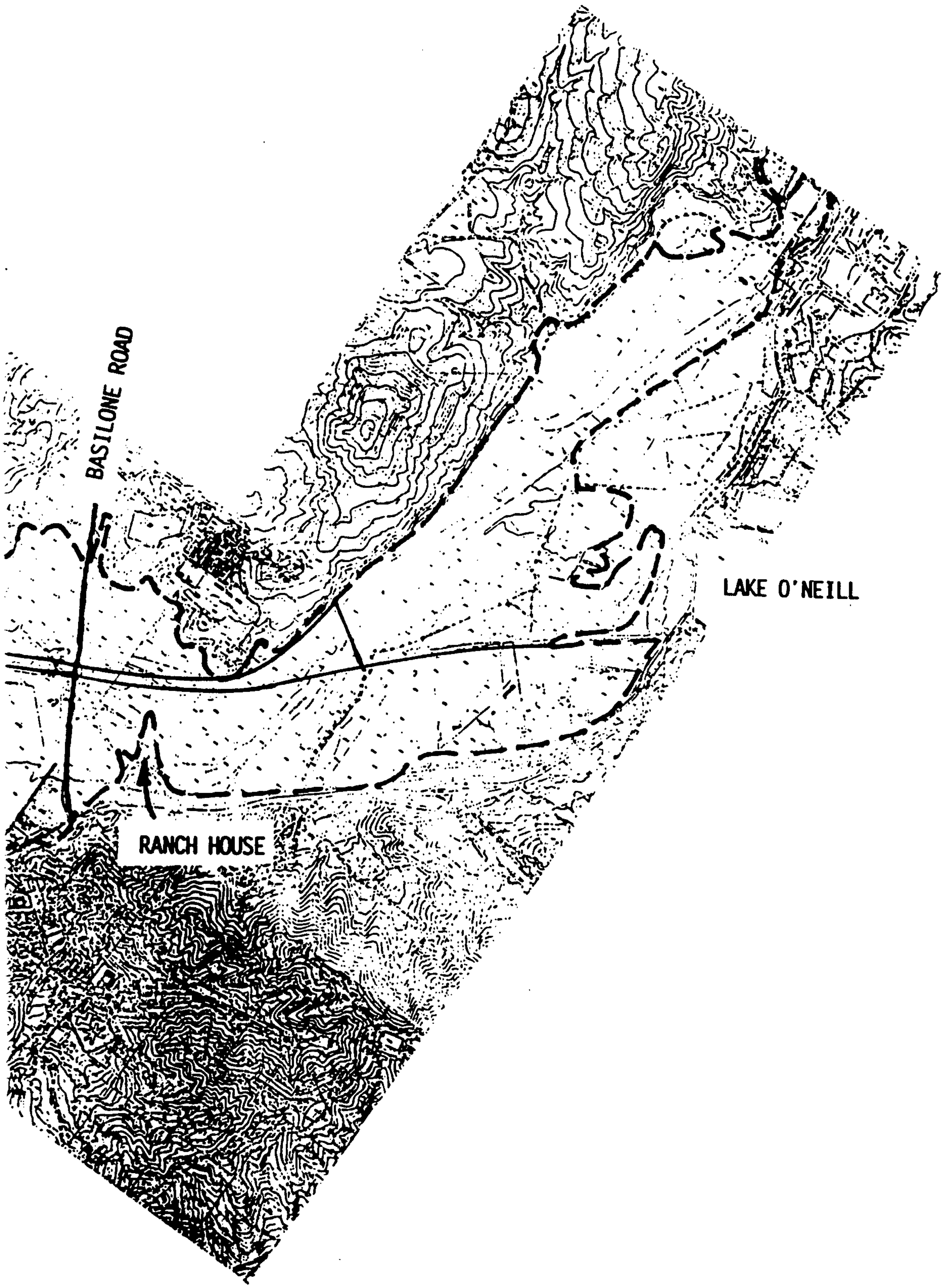
2000'

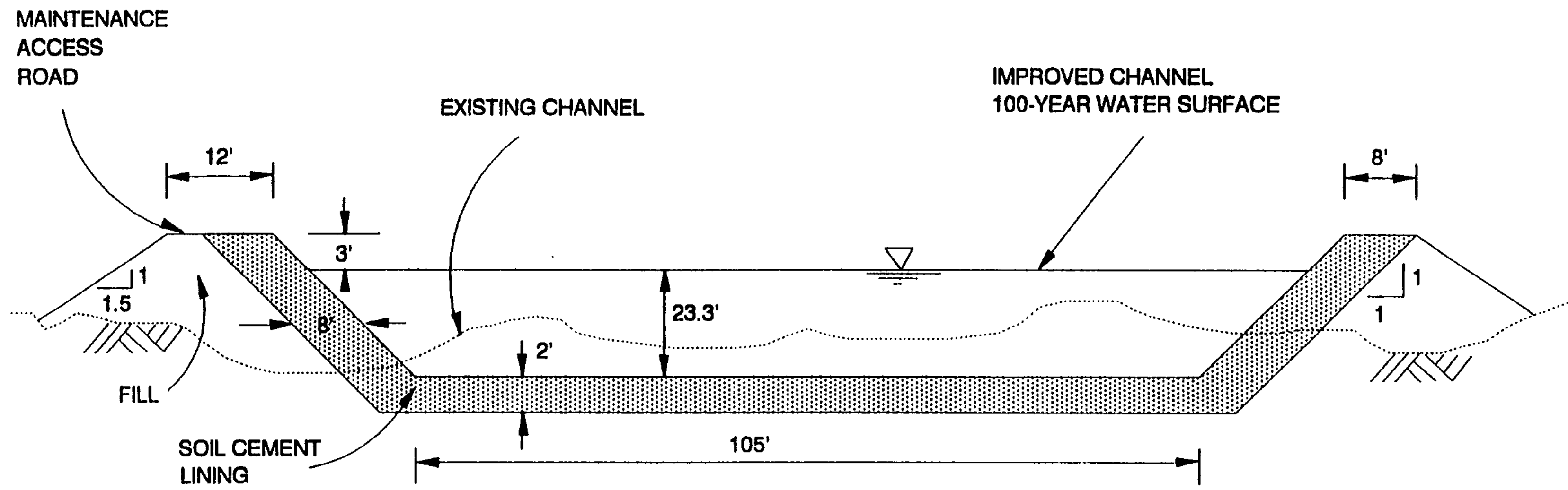

CURRENT 100-YEAR FLOOD BOUNDARY
BASILONE ROAD
OSED CHANNEL
MUNN FIELD
RANCH HOUSE
NT

Plan View



Plan View of Concrete Lined Channel

Figure C-1



Typical Section of Concrete Lined Channel

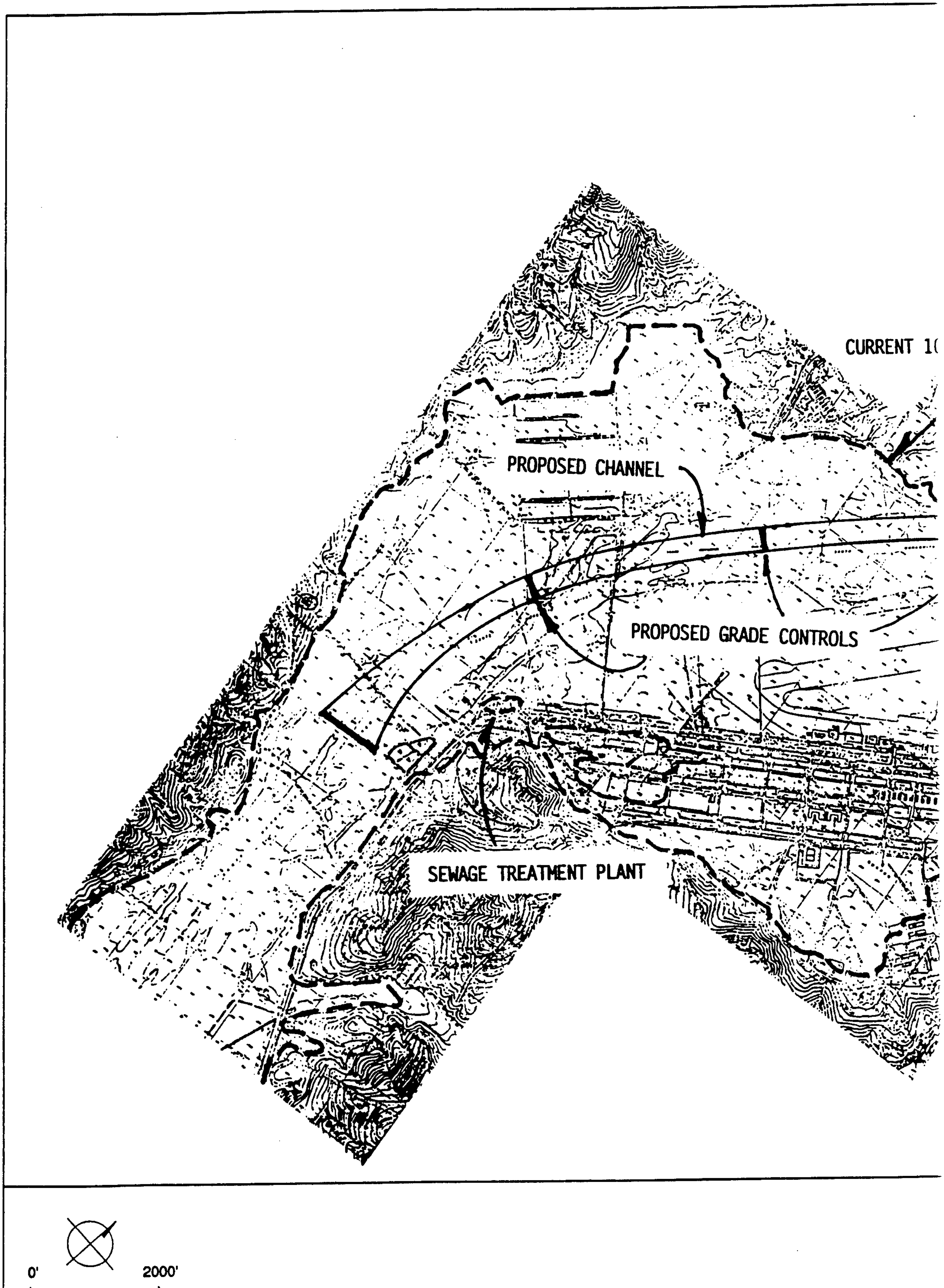
Figure C-2

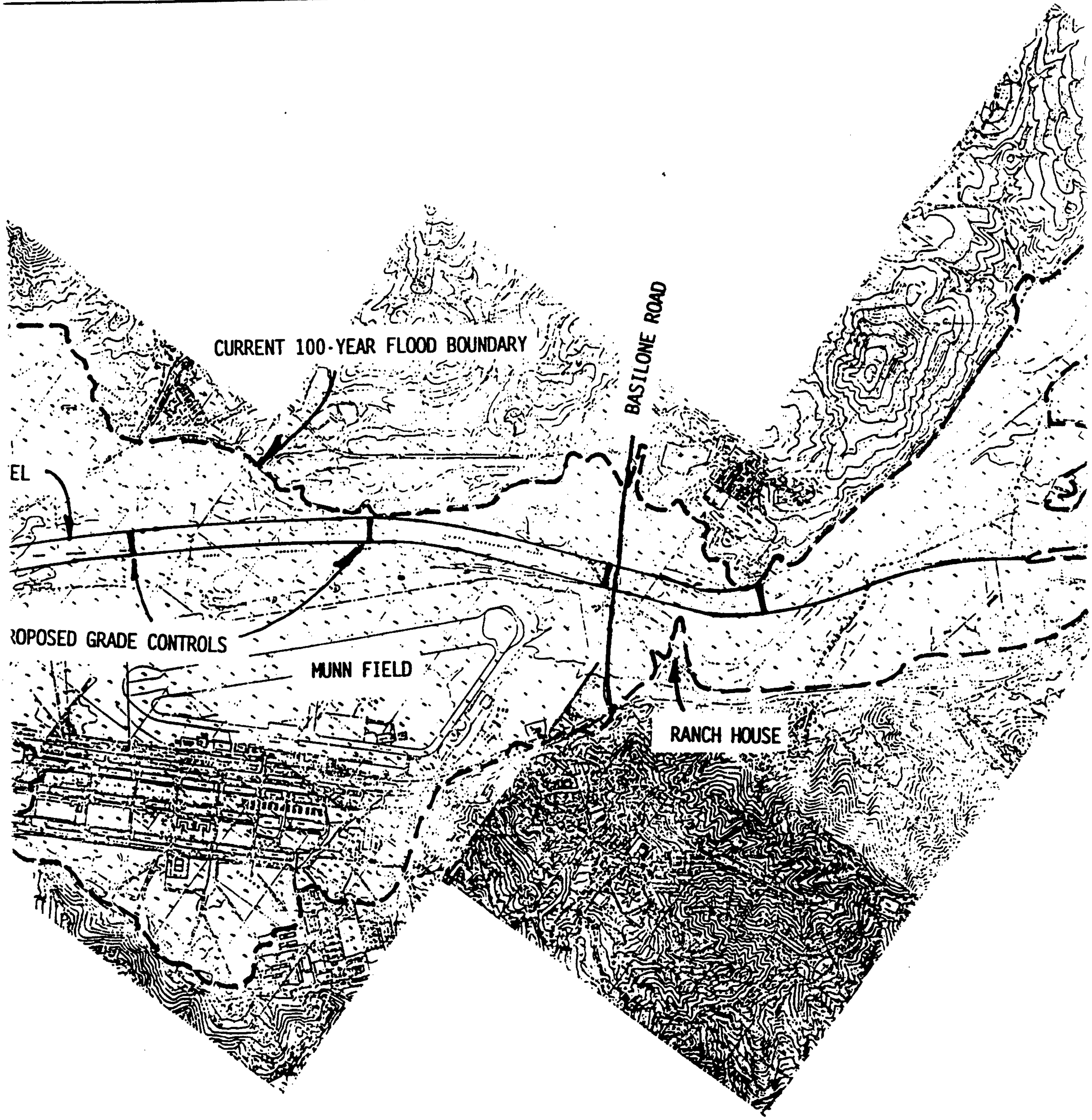
Result of Criteria Evaluation: Alternative Eliminated. The lined channel alternative was eliminated because of flight pattern intrusion (Criterion 2B), length of permitting and construction (Criterion 2C), and environmental impacts to water resources (Criterion 3A) and biological resources (Criterion 3B). According to the MCB Camp Pendleton (Commander M.P. Migliore, Public Works, Memorandum, October 1995), the MCAS Camp Pendleton (Martin Lubarsky, Memorandum, October 1995), and the ACOE (Simons, Li & Associates, 1995), the concrete lined channel was eliminated because it would adversely impact the recharge of the groundwater aquifer in the lower Santa Margarita Subbasin, which provides from 60 to 70 percent of the MCB Camp Pendleton/MCAS Camp Pendleton water supply. These sources also cited the direct loss of riparian habitat (Criterion 3B) as additional reasons for elimination.

Soft Bottom Channel. The soft bottom channel evaluated to provide flood protection would have soil-cement or riprap banks. The soil cement banks would provide additional structural stability to the riprap, which would require periodic replacement and restoration and the use of geotextile and gravel filter underlayers (Figures C-3 and C-4). A range of channel bottom widths (300 to 1,000 feet) and 1:1 side slopes were evaluated.

The 100-year hydraulic characteristics and the estimated lining volume of the constructed channel were investigated to determine the water flow depths and flow velocities related to channel performance and construction costs. The results of this investigation indicated that the optimal lined channel would be a soft bottom channel with a bottom width of 300 feet, 100-year flow depth of 15.8 feet, and a flow velocity of 12.8 feet per second. The soft bottom channel would require 47 acres for associated structures and flood control components.

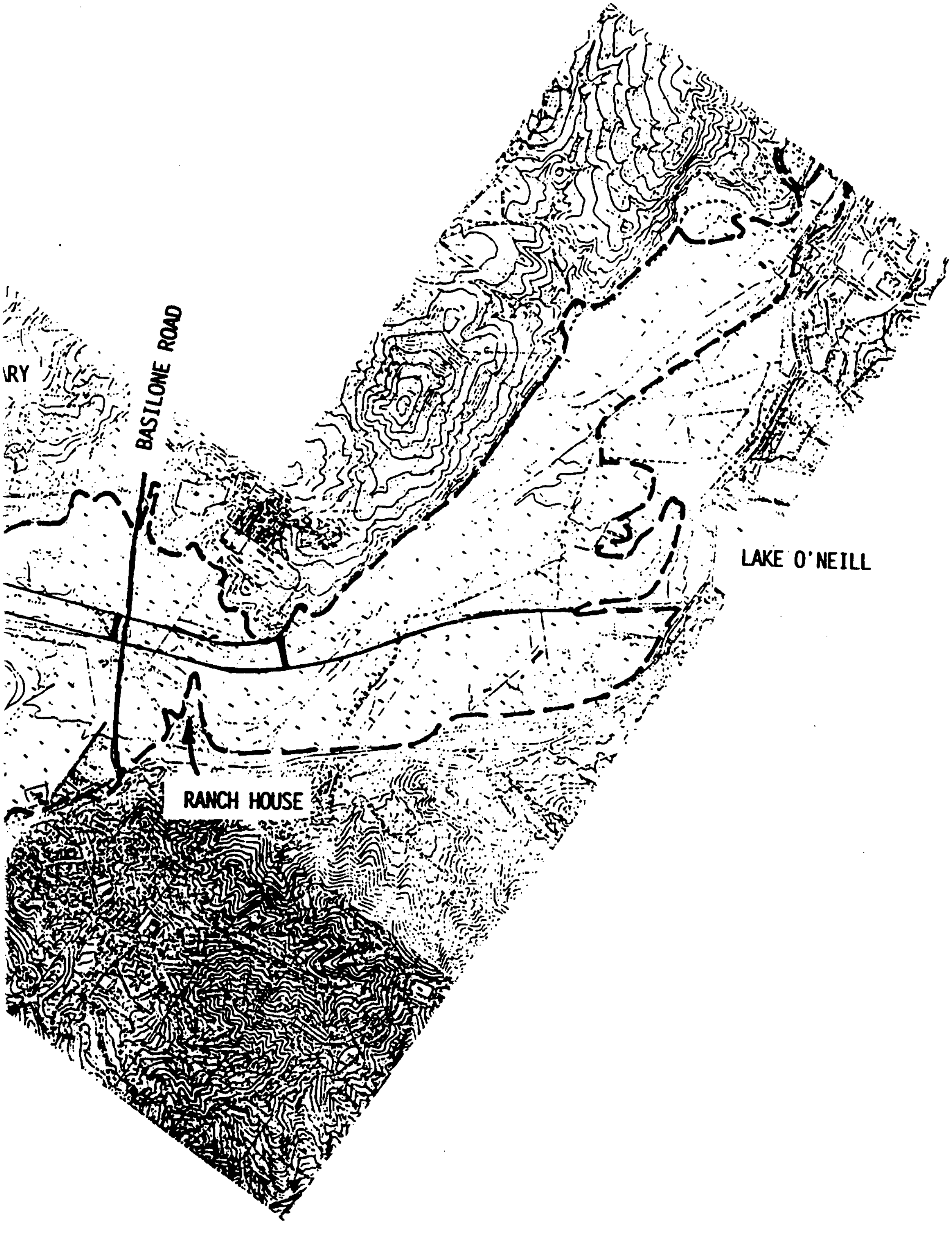
Analysis of Siting Criteria. The soft bottom channel with soil cement banks and a 300-foot-wide bottom would provide safe and efficient hydraulic control measures. This alternative would be less predictable than the lined channel because vegetation conditions in the channel would affect hydraulic water flow (Criterion 1A). The soft bottom channel would provide conveyance capacity and scour protection with a range of vegetation in the channel (Criterion 1B). The soft bottom channel would require periodic maintenance (vegetation clearance) to ensure adequate water flow (Criterion 1C). The soft bottom channel would minimize the channel width to 300 feet (Criterion 1D). The soft bottom channel would protect the operations of MCB Camp Pendleton/ MCAS Camp Pendleton (Criterion 2A). The south wall of the soft bottom channel would require the raising of the Basilone Road Bridge crossing, thereby resulting in the intrusion of high-profile vehicles into the MCAS Camp Pendleton Approach-Departure Clearance Imaginary Surface (Criterion 2B). The soft bottom channel would provide timely protection of MCB Camp Pendleton/MCAS Camp Pendleton operations (Criterion 2C).


CURRENT 1(
PROPOSED CHANNEL
PROPOSED GRADE CONTROLS
SEWAGE TREATMENT PLANT
0'
2000'


CURRENT 100-YEAR FLOOD BOUNDARY
BASILONE ROAD
EL
ROPOSED GRADE CONTROLS
MUNN FIELD
RANCH HOUSE

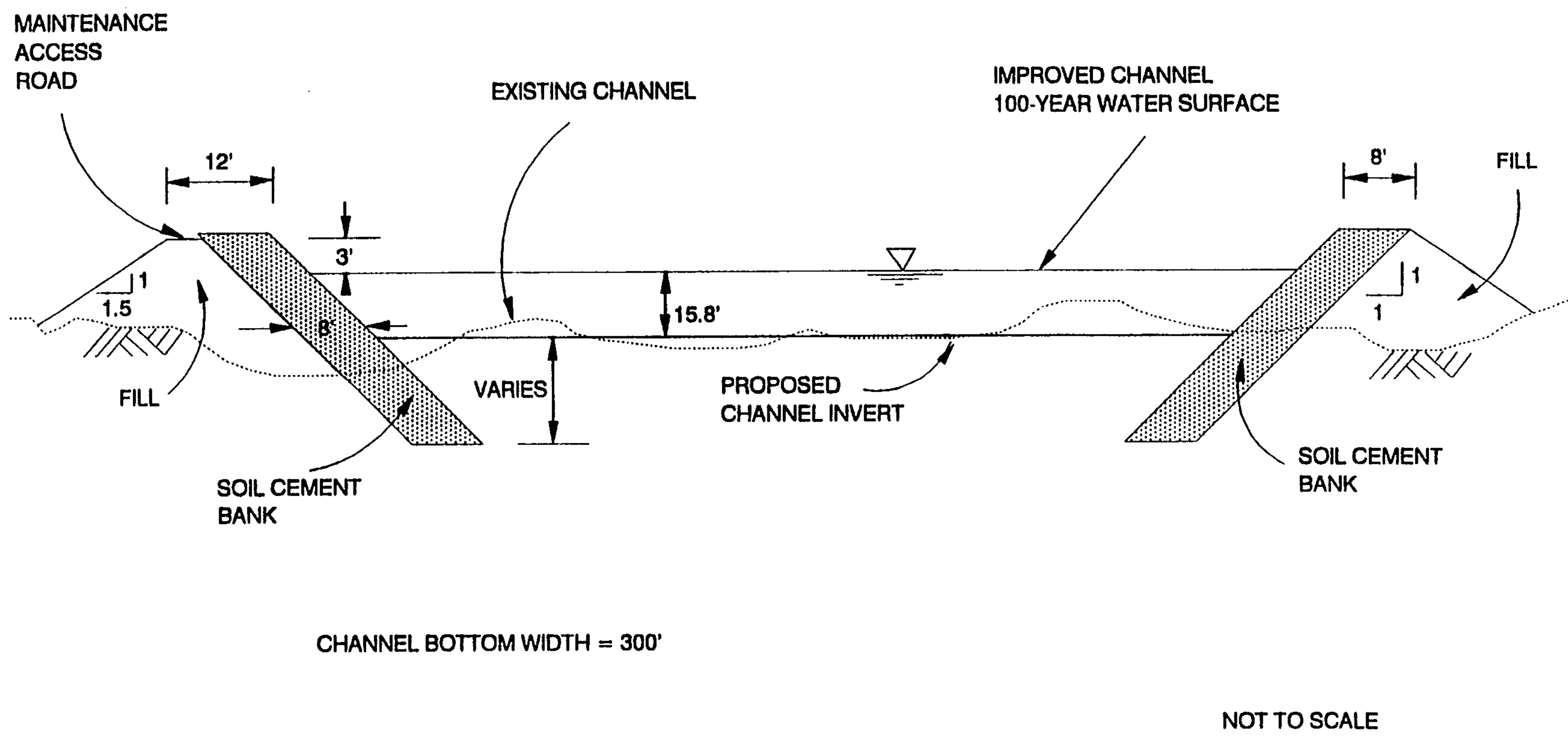
Plan Vie

2



Plan View of Soft Bottom Channel

Figure C-3



Typical Section of Soft Bottom Channel

Figure C-4

The soft bottom channel would allow the percolation of surface waters to recharge groundwater aquifers (Criterion 3A). The soft bottom channel would require the removal of some biological resources during vegetation clearance as part of periodic maintenance (Criterion 3B).

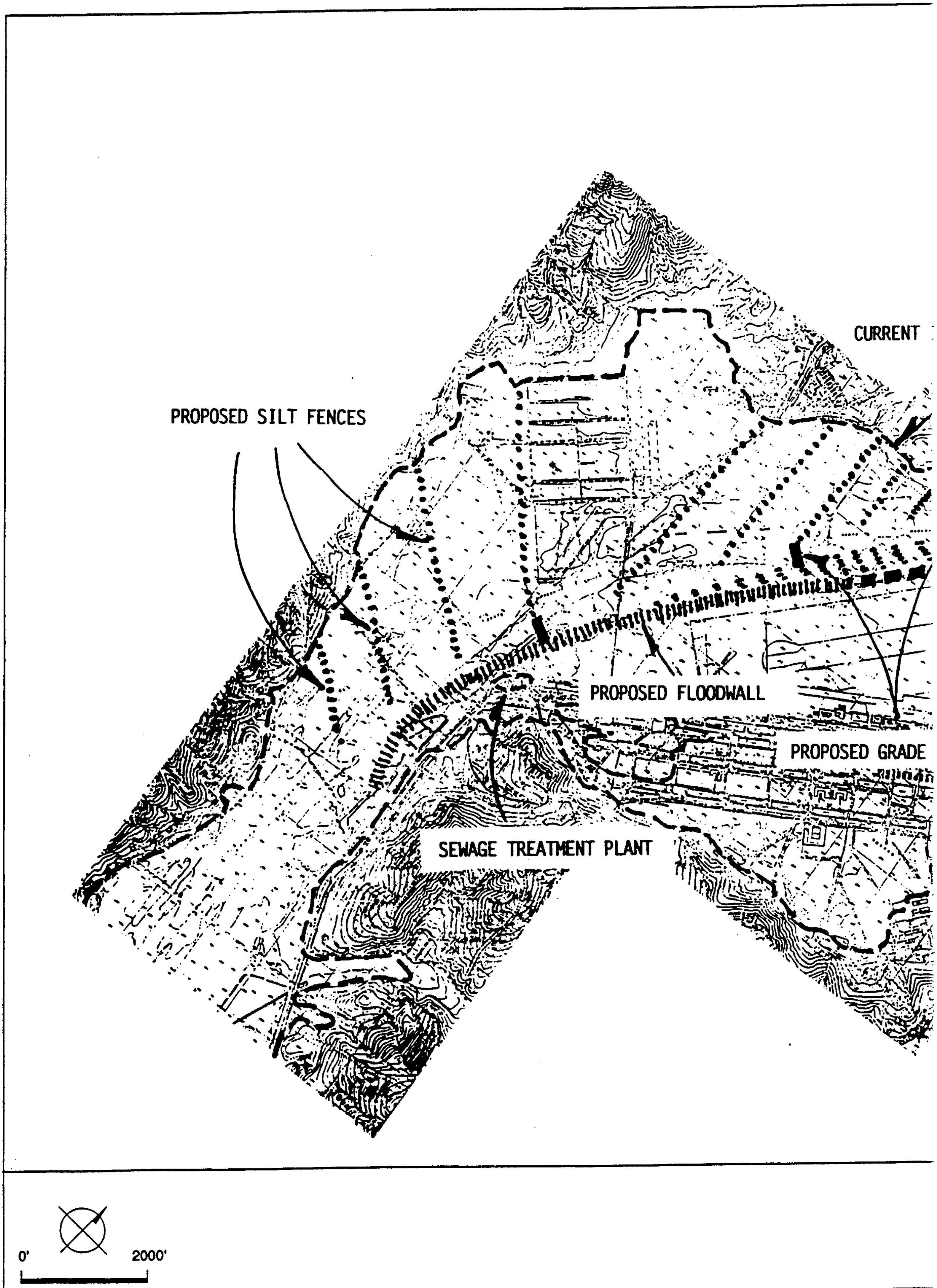
Result of Criteria Evaluation: Alternative Eliminated. The soft bottom channel alternative was eliminated because it would not minimize channel maintenance (Criterion 1C), and would result in flight pattern intrusion (Criterion 2B) and environmental impacts to biological resources (Criterion 3B). According to the MCB Camp Pendleton (Commander M.P. Migliore, Public Works, Memorandum, October 1995), the MCAS Camp Pendleton (Martin Lubarsky, Memorandum, October 1995), and the ACOE (Simons, Li & Associates, 1995), the soft bottom channel would require extensive and costly annual desilting operations to remove accumulated silt deposits resulting from the channel restriction.

Floodwall/Levee

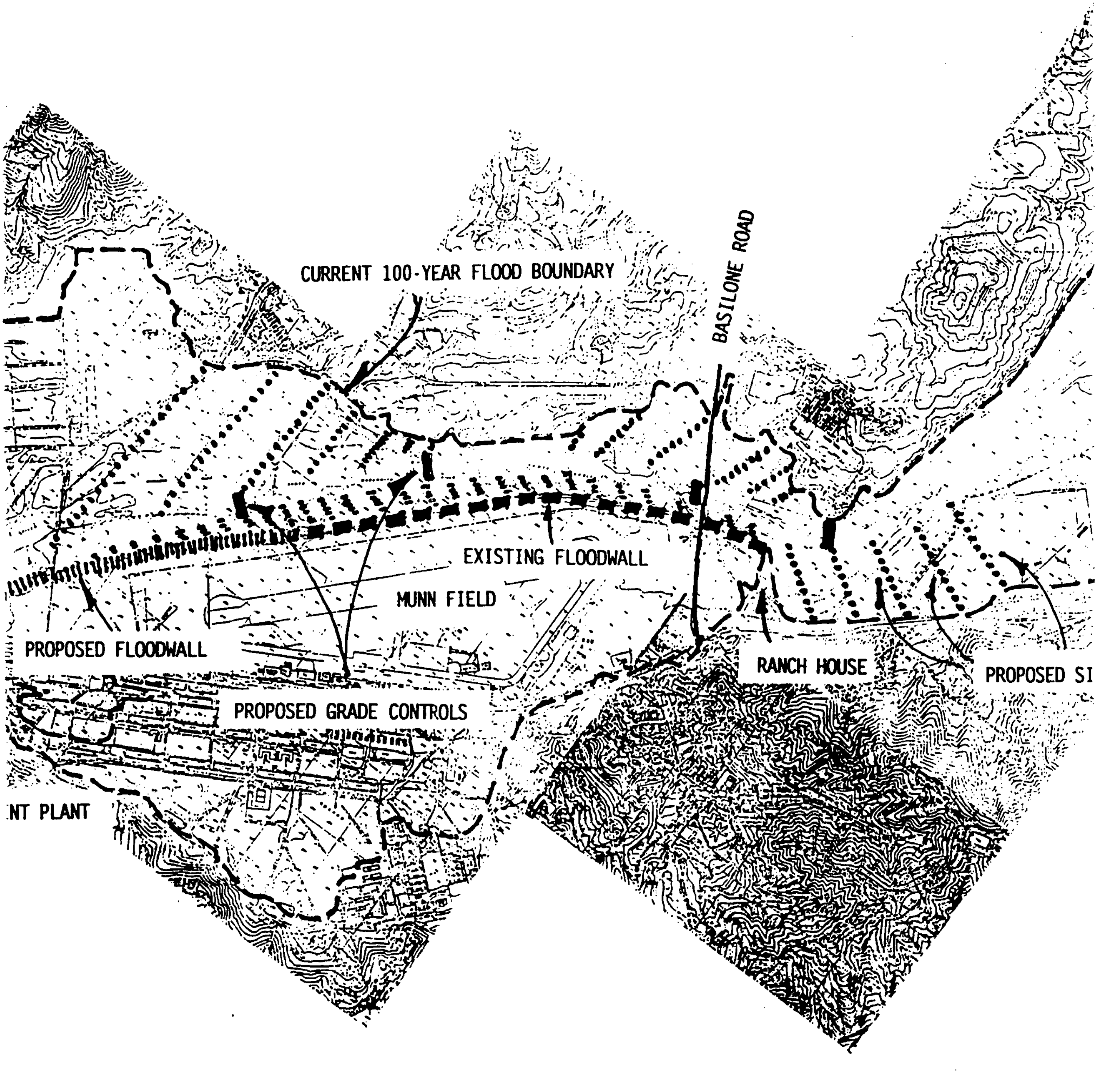
Floodwall. A floodwall located within the existing temporary levee alignment would be similar to the soft bottom channel alternative along the south side of the river (Figures C-5 and C-6). This alternative would require spur dikes or silt fences along the north bank to direct and confine the water flow to the channel. The floodwall would be constructed of reinforced concrete and would provide protection from a 100-year flood event along the south side of the river. The floodwall would maintain the channel width of 1,000 feet.

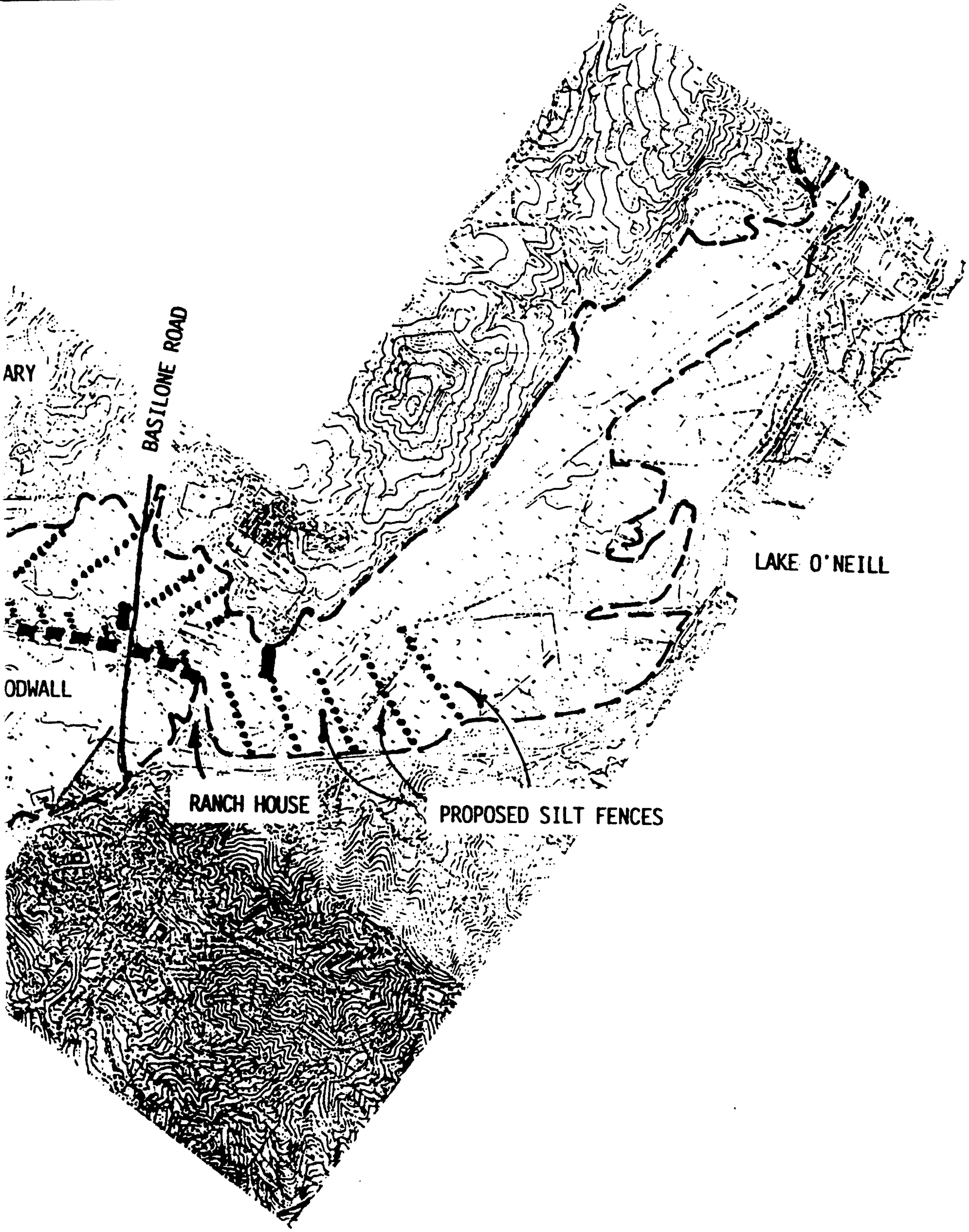
Analysis of Siting Criteria. The floodwall would provide less predictable hydraulic and sediment transport characteristics compared to the lined and soft bottom channels (Criteria 1A and 1B). However, a floodwall of sufficient height and footing would allow the river channel to erode, shift, or aggrade with minor channel maintenance (Criterion 1C). Without construction of additional spur dikes/silt fences upstream, the floodwall would require a 1,000-foot channel width, which is much larger than with the lined and soft bottom channels (Criterion 1D). The floodwall would protect the operations of MCB Camp Pendleton/MCAS Camp Pendleton (Criterion 2A). The floodwall height of 26 feet would require the raising of the Basilone Road Bridge crossing, thereby resulting in the intrusion of high-profile vehicles into the MCAS Camp Pendleton Approach-Departure Clearance Surface (Criterion 2B). The floodwall would provide timely protection of MCB Camp Pendleton/MCAS Camp Pendleton operations (Criterion 2C).

The floodwall would be located primarily within the footprint of the existing temporary levee and would minimize the disturbance to the existing channel system. It would allow the percolation of surface waters to recharge groundwater aquifers (Criterion 3A). The floodwall would minimize the impacts to sensitive habitats within the river channel; however, the east segment of the floodwall would extend beyond the existing temporary floodwall and would result in impacts to riparian habitat located west of the MCAS Camp Pendleton runway (Criterion 3B).



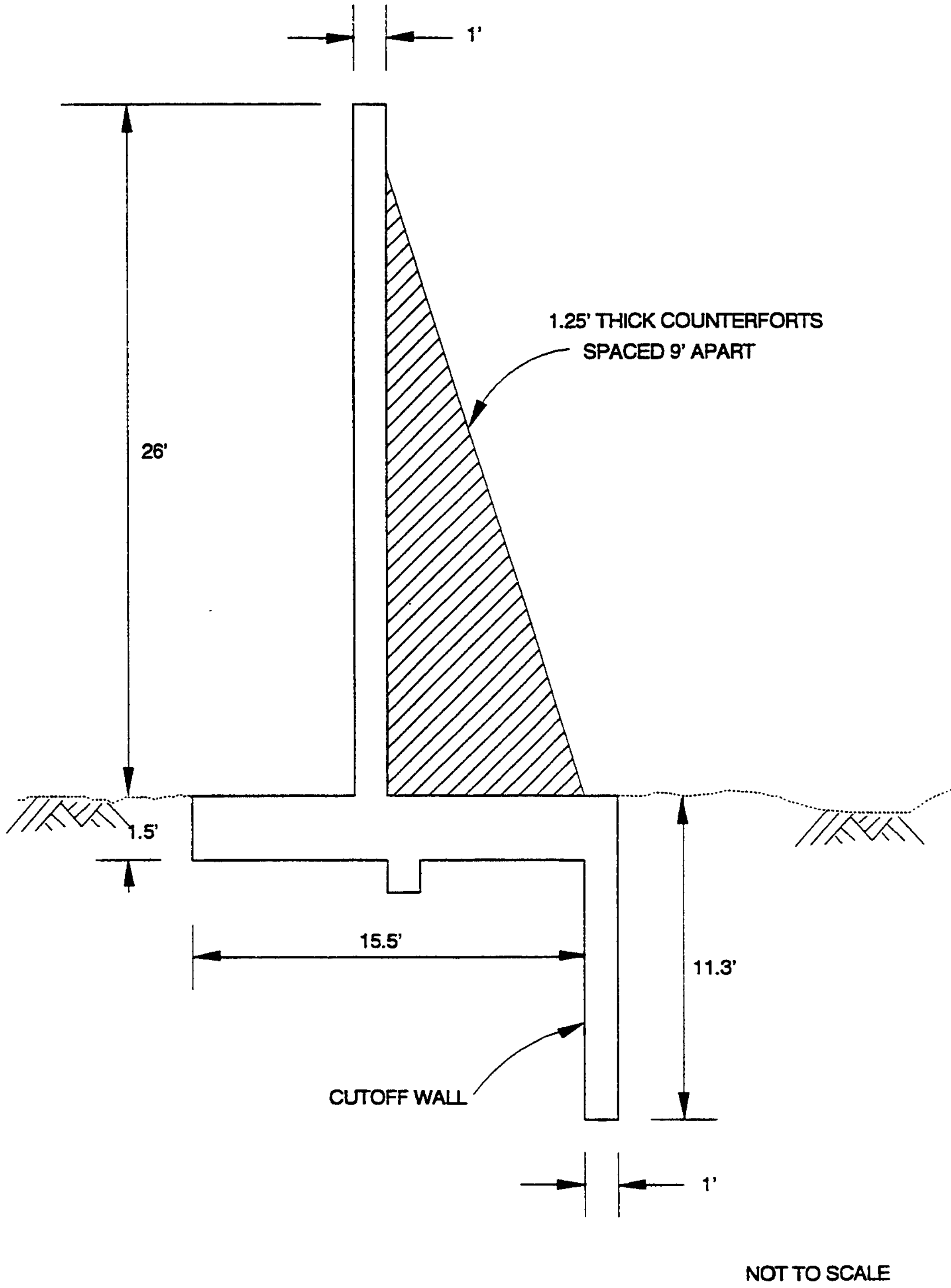
CURRENT
PROPOSED SILT FENCES
PROPOSED FLOODWALL
PROPOSED GRADE
SEWAGE TREATMENT PLANT
0'
2000'


CURRENT 100-YEAR FLOOD BOUNDARY
BASILONE ROAD
EXISTING FLOODWALL
MUNN FIELD
PROPOSED FLOODWALL
RANCH HOUSE
PROPOSED SI
PROPOSED GRADE CONTROLS
NT PLANT



Plan View of Floodwall

Figure C-5



Typical Section of Floodwall

Figure C-6

Even though the floodwall alternative had a positive evaluation in all the selection criteria except for flight pattern intrusion (Criterion 2B) and environmental impacts to biological resources (Criterion 3B), poor soil loadbearing conditions in the floodplain raised serious concerns during the pre-design engineering evaluations about the constructibility of the floodwall concept. Construction of the massive footing to meet the necessary design requirements under the existing soil conditions was determined to be so cost prohibitive that the floodwall concept was abandoned in lieu of an earthen levee as the preferred engineering design alternative in this class of flood control improvement.

Levee. A levee located within the existing temporary levee alignment would be similar to the floodwall with a construction corridor width of 150 feet. This alternative would require spur dikes and silt fences along the north bank and upstream of the Basilone Road Bridge crossing to direct and confine the flow of the river.

The height of the levee would vary from 12 to 27 feet and would be constructed of mechanically reinforced native material. Side slopes could vary from a 1:1 ratio (i.e., a 1-foot vertical rise to a 1-foot horizontal run) to a 3:1 ratio depending on the alternative selected. In accordance with Navy design requirements, the levee would incorporate an inspection trench a minimum of 6 feet deep and 12 feet wide, with side slopes utilizing a 4-foot vertical rise to a 1-foot horizontal run. A 16-foot-wide service road would run along the top of the levee for its full length. Access ramps from the top of the levee to the river would be incorporated. Rifle Range Road, which now crosses the river and connects the rifle range and Vandegrift Boulevard would be removed as a result of the levee.

The levee would incorporate several scour protection mechanisms on the outboard side (adjacent to the river). A rock-filled toe trench would be constructed to protect against undermining scour. The trench would be a minimum of 6 feet wide and vary from 6 to 12 feet deep. The outboard face of the levee would be protected by cellular concrete, except in locations of sharp turns where rock slope protection would be used to provide increased scour protection.

A small drainage ditch would be constructed on the inboard (adjacent to MCAS Camp Pendleton) side of the levee to relieve water pressure that would otherwise result in "sand boiling." The drainage ditch would be gravel lined, run the full length of the levee, and connect into the stormwater management system near STP No. 3.

The construction corridor, including the levee, toe trench, drainage ditch, and any other operations related to construction, would be 150 feet wide.

In addition to the levee, a series of sediment control structures would be implemented within the river. The intent of these structures is to create a sediment balance throughout the stretch of the river protected by the levee so that sediment is neither collecting or eroding as a result of the project. These structures would consist of either spur dikes, silt fences, or selected grading of the banks of the river channel. The spur dikes would be constructed by excavating below the riverbed and constructing an earth-core/rock-filled berm that would extend approximately 5 feet above the bed of the river. The dikes would trap sediment during lower flow storm events (2- to 25-year recurrence intervals). The sediment would be carried downstream during more infrequent flooding events (i.e., greater than 25-year flood events). Silt fences would perform a similar function. These fences would be a "softer" feature than the spur dikes and could provide some sediment control while impacting on a smaller area. Silt fences would consist of a geotextile netting strung across metal fence posts. The fences would be placed in the river perpendicular to the banks. The fences would trap sediment during low flow events and would "lie down" during the higher flow events, allowing sediment to be transported downstream. Selected bank grading could also be used to create smoother bends and transitions in the riverbed. Smooth transitions would allow for more predictable and constant flow patterns across any given cross-section. Smooth transitions help minimize erosion and deposition patterns that develop when a bend in a river results in increased flow velocity on one bank and decreased flow velocity on the other bank.

Analysis of Siting Criteria. The levee would provide less predictable hydraulic sediment transport characteristics compared to the lined and soft bottom channels (Criteria 1A and 1B). However, a levee of sufficient height and footing would allow the river channel to erode, shift, or aggrade with minimal channel maintenance (Criterion 1C). With construction of additional spur dikes/silt fences upstream, the levee would maintain the existing channel width (Criterion 1D). The levee would protect the operations of MCB Camp Pendleton/MCAS Camp Pendleton (Criterion 2A). The maximum levee height of 20 feet would require the raising of Basilone Road Bridge crossing thereby resulting in the intrusion of high profile vehicles into the MCAS Camp Pendleton Approach-Departure Clearance Surface (Criterion 2B) which can be alleviated with installation of a traffic light controlled by the Air Traffic Control Tower.

The levee would be located primarily within the footprint of the existing temporary levee and would minimize the disturbance to the existing channel system. The levee would allow the percolation of surface waters to recharge groundwater aquifers (Criterion 3A). The levee would minimize the impacts to sensitive habitats within the river channel; however, the east and west segments of the levee would extend beyond the existing temporary levee and would result in impacts to riparian habitat (Criterion 3B).

Result of Criteria Evaluation: Alternative Retained. The levee is an alternative for Component A - Flood Control Improvement and is retained for further analysis in this EIS.

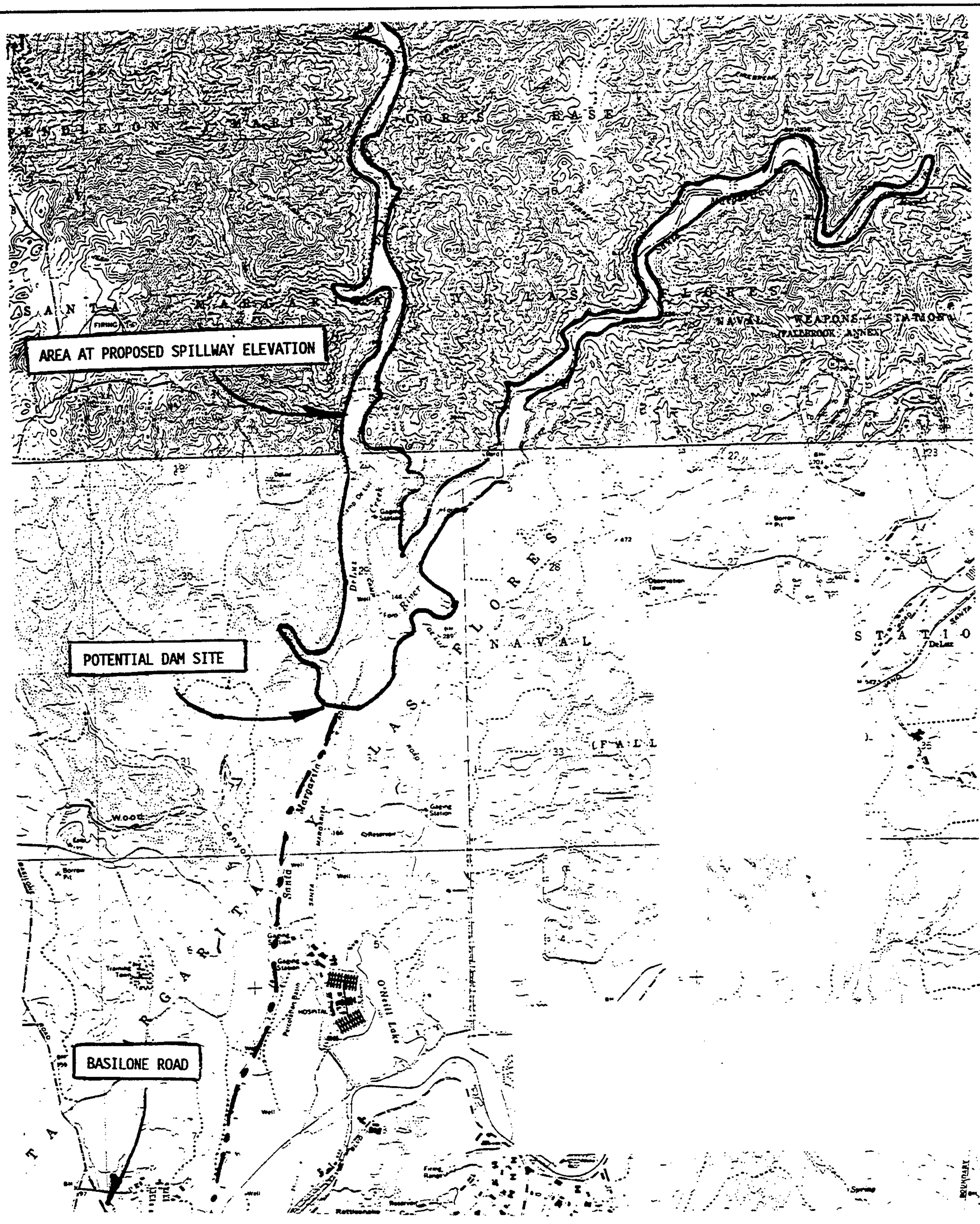
Onbase Detention Dam. With this alternative, an onbase detention dam within a canyon upstream of the project reach would be used to regulate the water flow depths and flow velocities through the lower Santa Margarita River (Figure C-7). The onbase detention dam would reduce the discharge conveyed downstream through the project reach. Hydraulic analysis of the existing channel indicated that flows with the existing 10-year flood event (13,000 cfs) could be accommodated with no flood control improvements at the MCAS and the Basilone Road Bridge.

The detention dam would be sited approximately 6,500 feet upstream of the Lake O'Neill diversion structure. It would consist of a dam structure with a small outlet, a spillway, and a stilling basin. The height of the dam would provide protection for a 100-year flood event and water flow would be controlled through the outlet. In the event that floods exceed the 100-year peak volume characteristics, the water would pass over the spillway and into a downstream stilling basin. The detention dam would require 10 acres for associated structures and flood control components. Construction of the detention dam would result in the inundation of over 500 acres.

Analysis of Siting Criteria. The onbase detention dam would reduce the water flow depths and water flow velocities with floods of up to a 100-year event (Criterion 1A). The detention dam would provide adequate sediment control and scouring measures for the downstream area (Criterion 1B); however, scour problems may occur upstream at the Lake O'Neill diversion structure. The onbase detention dam would act as an effective debris trap which would require low channel maintenance (Criterion 1C). The onbase detention dam would minimize the channel width required for the Basilone Road bridge to its present width (Criterion 1D). The onbase detention dam would protect the downstream operations of MCB Camp Pendleton/MCAS Camp Pendleton (Criterion 2A). The onbase detention dam would not require the raising of the Basilone Road Bridge crossing and would not intrude into the MCAS Approach-Departure Clearance Imaginary Surface (Criterion 2B). Based on the projected length of time for permitting, processing, and construction of this project, and the associated economic costs, the Base would be without flood protection for a longer period of time than that estimated for other alternatives.

The dam alternative would reduce water flows in the lower Santa Margarita River required to recharge groundwater aquifers through percolation (Criteria 3A). The onbase detention dam may have significant impacts to biological and cultural resources inundated by water held in the onbase detention dam (Criterion 3B).

Result of Criteria Evaluation: Alternative Eliminated. The onbase detention dam alternative was eliminated because the base would not receive the necessary flood protection for an extended period of time (Criterion 2C). In addition, the onbase detention dam may reduce groundwater recharge (Criterion 3A) and would have significant impacts to biological and cultural resources inundated by water held in the dam (Criterion 3B).



Potential On-Base Dam Location

Figure C-7

Offbase Detention Dam. Characteristics of an offbase detention dam would be similar to those of the onbase detention dam discussed in the preceding section. Additionally, the process associated with encroachment, acquisition, and condemnation of private property located off MCB Camp Pendleton would increase the economic costs and implementation time of this alternative. This alternative was evaluated and rejected under flood control alternatives in a *Basewide Water Requirement Availability Study* (Leedshill-Herkenhoff, Inc., 1989) which anticipated a dam in De Luz would inundate approximately 800 acres of Riparian Habitat and would not provide protection against long duration floods which might fill the reservoir flood control capacity before the peak flood arrives (Leedshill-Herkenhoff, 1989).

Analysis of Siting Criteria. The analysis of siting criteria is identical to that presented for the onbase detention dam alternative.

Result of Criteria Evaluation: Alternative Eliminated. The offbase detention dam alternative was eliminated for many of the same reasons as the onbase detention dam alternative. This alternative had additional time and cost constraints because the government would need to acquire this property. It is expected that this would lengthen the timeframe required to approve and construct this alternative, leaving MCB Camp Pendleton/MCAS Camp Pendleton without necessary flood control for a longer period of time.

Santa Margarita Flood Control Project (P-010) - Stormwater Management System

Alternatives to the Proposed Action which would fulfill the purpose and need were developed by MCB Camp Pendleton/MCAS Camp Pendleton. The alternatives for the stormwater management system were evaluated based on an engineering description prepared by Winzler and Kelly (1996). Based on this description, the alternatives were evaluated using the following selection criteria:

Criterion 1: Engineering Feasibility - Hydraulic Control
Criterion 2: Operations - MCB Camp Pendleton/MCAS Camp Pendleton Mission
Criterion 3A: Environmental Impacts - Biological Resources
Criterion 3B: Environmental Impacts - Hazardous Materials/Health

The following is a description of each alternative, the analysis of selection criteria, and the result of the criteria evaluation. The criteria evaluation includes the primary reasons an alternative was eliminated or retained for further consideration. Table 2.5-1 provides a qualitative comparison of the alternatives for the stormwater management system (Flood Control Project P-010). One alternative was eliminated from further consideration, and one alternative for the stormwater management system was retained for further analysis in this EIS. Both the flood control structure and stormwater management system must be implemented to fulfill the purpose and need of the flood control project.

If the flood control structure is not implemented, the stormwater management system would not be required. Therefore, a No Action Alternative for the stormwater management system was not evaluated independently from the No Action Alternative for the flood control structure.

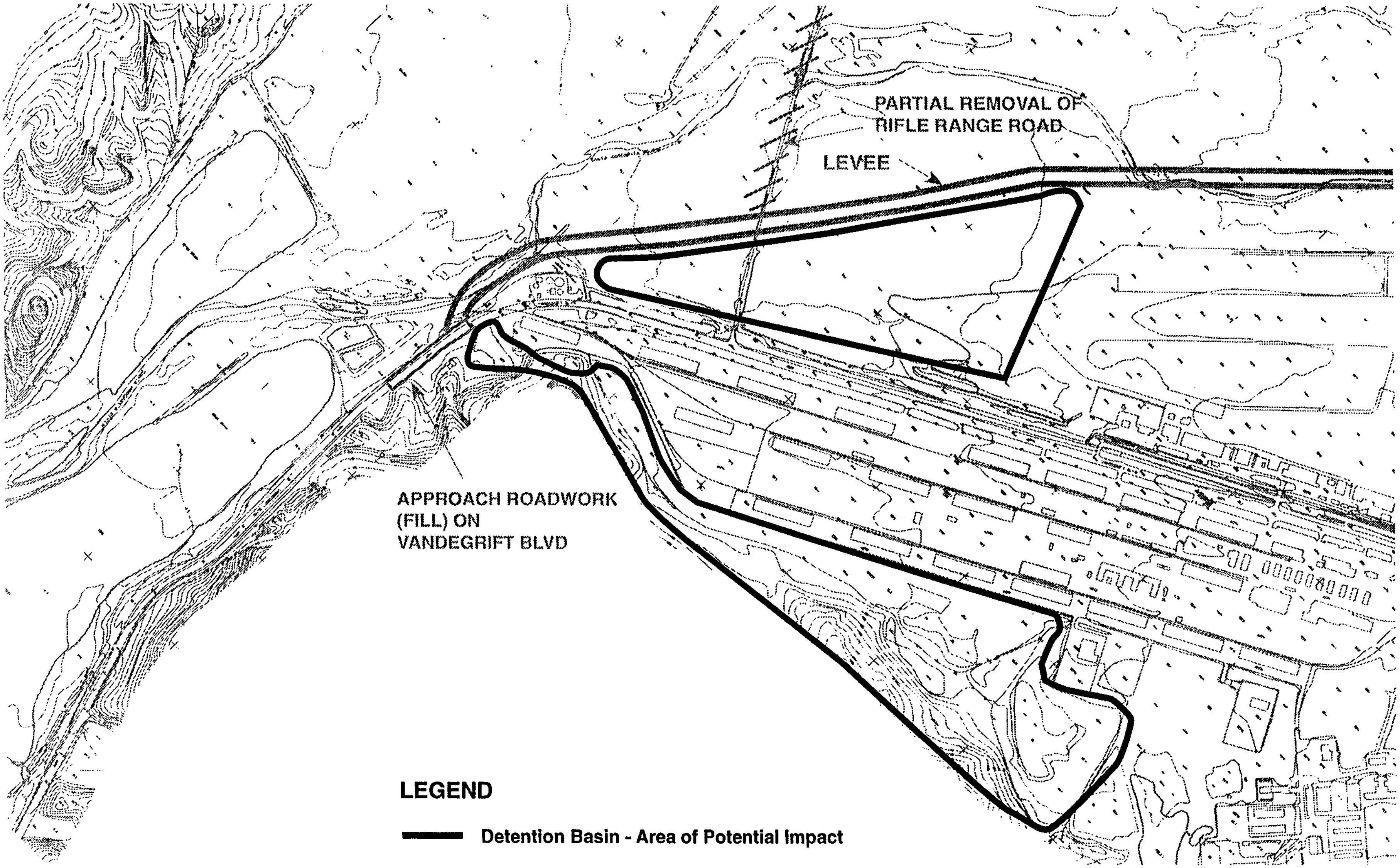
Pump Station. The stormwater management system would manage runoff from 2,094 acres, including the MCAS and the Chappo (22) Area. The stormwater management system would withstand a 100-year flood event with a duration of 24 hours; the total flow required to be managed through the system is 1,498 cfs.

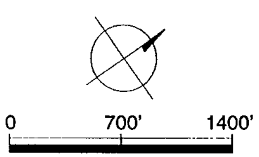
The pump station would be a component of the stormwater management system. The pump station was evaluated for two scenarios: 1) a pump station implemented in conjunction with a detention basin; and 2) a larger pump station implemented without a detention basin. The pump station would discharge drainage from the MCAS Camp Pendleton drainage basin which presently drains via the existing drainage channel. The pump station would process an estimated peak runoff of 826 cfs. The pump station would consist of a 20-foot-wide concrete approach channel to a well with a 36-inch-diameter gravity bypass pipeline equipped with a mechanical gate used for low river flow conditions. Six main pumps and two smaller pumps would be used in various combinations depending upon water flow conditions and the river flood stage.

Analysis of Selection Criteria. The pump station, implemented in conjunction with either the detention basin/pump station or the larger pump station only, would provide an adequate hydraulic control of surface water runoff discharge (Criterion 1). The pump station would support the operations of MCB Camp Pendleton/MCAS Camp Pendleton by providing surface water runoff drainage and discharge into the river (Criterion 2). The pump station would minimize impacts to biological resources because the pump station would require a minimal construction corridor (Criterion 3A). The pump station would minimize impacts from hazardous materials (Criterion 3B).

Result of Criteria Evaluation: Alternative Retained. The pump station is an alternative for the stormwater management system retained for further analysis in this EIS.

Detention Basin - North of Vandegrift Boulevard. With this alternative, a 162-acre detention basin north of Vandegrift Boulevard, adjacent to the STP No. 3, and west of the MCAS Camp Pendleton runway would be excavated (Figure C-8). The detention basin would collect and retain a portion of surface water runoff drainage based on a 100-year flood event occurring with a 24-hour storm event (a total volume of 437-acre-feet with a peak discharge of 1,680 cfs).





Stormwater Management System
Detention Basins North and South of Vandegrift Boulevard

Figure C-8

Analysis of Selection Criteria. The detention basin north of Vandegrift Boulevard would provide adequate hydraulic control of surface water runoff (Criterion 1). This alternative would support the operations of MCB Camp Pendleton/MCAS Camp Pendleton by providing a stormwater management system for the retention and drainage of surface water runoff (Criterion 2). This alternative would not minimize impacts to biological resources because the area west of the MCAS Camp Pendleton runway is riparian habitat bordering the river; the excavation of 162 acres for the detention basin would result in significant, unmitigable impacts to biological resources (Criterion 3A). This alternative may impact groundwater contamination and would not minimize impacts to environmental health (Criterion 3B).

Result of Criteria Evaluation: Alternative Eliminated. The Detention Basin - North of Vandegrift Boulevard was eliminated because this alternative would excavate 162 acres which would result in negative, unmitigable impacts to biological resources and may impact groundwater contamination (Criterion 3A and 3B) (MCB Camp Pendleton, Environmental Security, 1995; and Winzler and Kelly, 1995).

Detention Basin - South of Vandegrift Boulevard. With this alternative, a 74-acre detention basin located south of Vandegrift Boulevard in the west portion of the Chappo (22) Area would be excavated (Figure C-8). The detention basin would collect and retain a portion of surface water runoff; the peak runoff from the Chappo (22) Area drainage basin is 794 cfs and the total volume of storage requirement is 230 acre feet. This detention basin would include a dike along Vandegrift Boulevard and a mechanical gate installed to meter flow out of the detention basin. This detention basin would be implemented with a secondary stormwater management system component consisting of a pump station or a gravity channel.

Analysis of Selection Criteria. The detention basin south of Vandegrift Boulevard in the east portion of the Chappo (22) Area would provide adequate hydraulic control of surface water runoff discharge (Criterion 1). This alternative would support the operations of MCB Camp Pendleton/MCAS Camp Pendleton by providing a stormwater management system for the retention and drainage of surface water runoff (Criterion 2). This alternative would minimize impacts to biological resources because the area south of Vandegrift to be excavated contains predominantly disturbed vegetation; the excavation of 74 acres for the detention basin would result in negative unmitigable impacts to biological resources (Criterion 3) (MCB Camp Pendleton, Environmental Security, 1995). This alternative may impact groundwater contamination and would not minimize impacts to environmental health (Criterion 3B).

Result of Criteria Evaluation: Alternative Eliminated. The Detention Basin - South of Vandegrift Boulevard was eliminated because this alternative would excavate 74 acres which would

result in negative, unmitigable impacts to biological resources (Criterion A) and would not minimize impacts to environmental health (Criterion 3B).

Gravity Channel. The gravity channel would be utilized only in conjunction with a pump station to discharge surface water runoff to the river using a gravity system. The gravity channel would drain water from two temporary natural detaining areas located in approximately the same area as the north and south detention basin alternative through a 20-foot-wide earthen channel to connect with an existing gravity channel. The gravity channel would cross the flood control improvement and continue downstream along the west side of Vandegrift Boulevard as a concrete box culvert and then discharge into the river.

Analysis of Selection Criteria. The gravity channel implemented in conjunction with a pump station would not provide adequate hydraulic control of surface water runoff discharge. The gravity channel would require a pump station as a backup mechanism and would require regular maintenance to remove sediment and debris to assure adequate flow (Criterion 1). The gravity channel would support the operations of MCB Camp Pendleton/MCAS Camp Pendleton by providing a component for surface water runoff transport, drainage, and discharge (Criterion 2). The gravity channel would minimize impacts to biological resources because the construction corridor would parallel a disturbed area along Vandegrift Boulevard (Criterion 3).

Result of Criteria Evaluation: Alternative Eliminated. The gravity channel, implemented in conjunction with a pump station, was eliminated from further consideration because it would not provide adequate hydraulic control of surface water runoff discharge (Criterion 1).

Basilone Road Bridge Replacement (P-030)

Alternatives to the Proposed Action which would fulfill the purpose and need were developed by MCB Camp Pendleton/MCAS Camp Pendleton. The alternatives for the bridge replacement project were evaluated based on an engineering description prepared by Winzler and Kelly (Winzler and Kelly, 1996) and an evaluation cited in the ACOE floodplain analysis and the MCB Camp Pendleton Traffic Engineering Study. Based on these studies, the alternatives were evaluated using the following selection criteria:

Criterion 1: Engineering Feasibility - Bridge Span/Channel Width
Criterion 2A: Operations - MCB Camp Pendleton/MCAS Camp Pendleton Mission
Criterion 2B: Operations - MCAS Camp Pendleton Flight Pattern Intrusion
Criterion 3: Environmental Impacts - Biological Resources

The following is a description of each alternative, the analysis of selection criteria, and the results of the criteria evaluation. The criteria evaluation includes the primary reasons an alternative was eliminated or retained for further consideration. Table 2.5-1 provides a qualitative comparison of the alternatives for the Basilone Road Bridge Replacement (P-030). One alternative was eliminated from further consideration and three alternatives for the Proposed Action and the No Action Alternative were retained for further analysis in the EIS.

Basilone Road Bridge - Existing Alignment

The Basilone Road Bridge - Existing Alignment would include a concrete bridge structure with single column support piers and a pile foundation. The bridge would span the flood control project and maintain a minimum clearance of 1 foot from the bottom of the bridge. As a result, the bridge crossing would incorporate roadway fills on the north and south side of the river necessary to accommodate the elevation of the bridge over the flood control project. The north roadway approach is 1,650 feet long and rises 12 feet above the existing Basilone Road. Roadway fills would be constructed from imported material mined from a borrow site.

This alternative would follow the existing Basilone Road alignment, but would elevate the bridge to clear the flood control project and provide a minimum channel width of 1,250 feet. The road would require a bridge span with eight piers within the Santa Margarita River. Because of the height increase, traffic on the bridge would encroach into the MCAS Camp Pendleton Approach-Departure Clearance Surface, a conical surface that reflects the takeoff and landing patterns of certain aircraft that utilize the MCAS Camp Pendleton airfield. This alternative incorporates a traffic light controlled by the MCAS Camp Pendleton Air Traffic Towers to stop vehicles during the takeoff and landing of aircraft that utilize the full reach of the Approach-Departure Clearance Imaginary Surface and would require a flight intrusion waiver.

Analysis of Selection Criteria. The existing alignment of the Basilone Road Bridge replacement would provide an adequate bridge span and channel width across the Santa Margarita River that would not create a hydraulic impediment (Criterion 1). The existing alignment would support the operations of MCB Camp Pendleton/MCAS Camp Pendleton (Criterion 2A). The existing alignment would raise the bridge crossing over the flood control project, thereby resulting in the intrusion of high-profile vehicles into the MCAS Camp Pendleton Approach-Departure Clearance Surface (Criterion 2B) which can be alleviated with installation of a traffic light controlled by the Air Traffic Control Tower. This alternative would minimize impacts to biological resources by locating the bridge replacement within the existing alignment for Basilone Road (Criterion 3).

Result of Criteria Evaluation - Alternative Retained. The Basilone Road Bridge - Existing Alignment is an alternative retained for further analysis in this EIS.

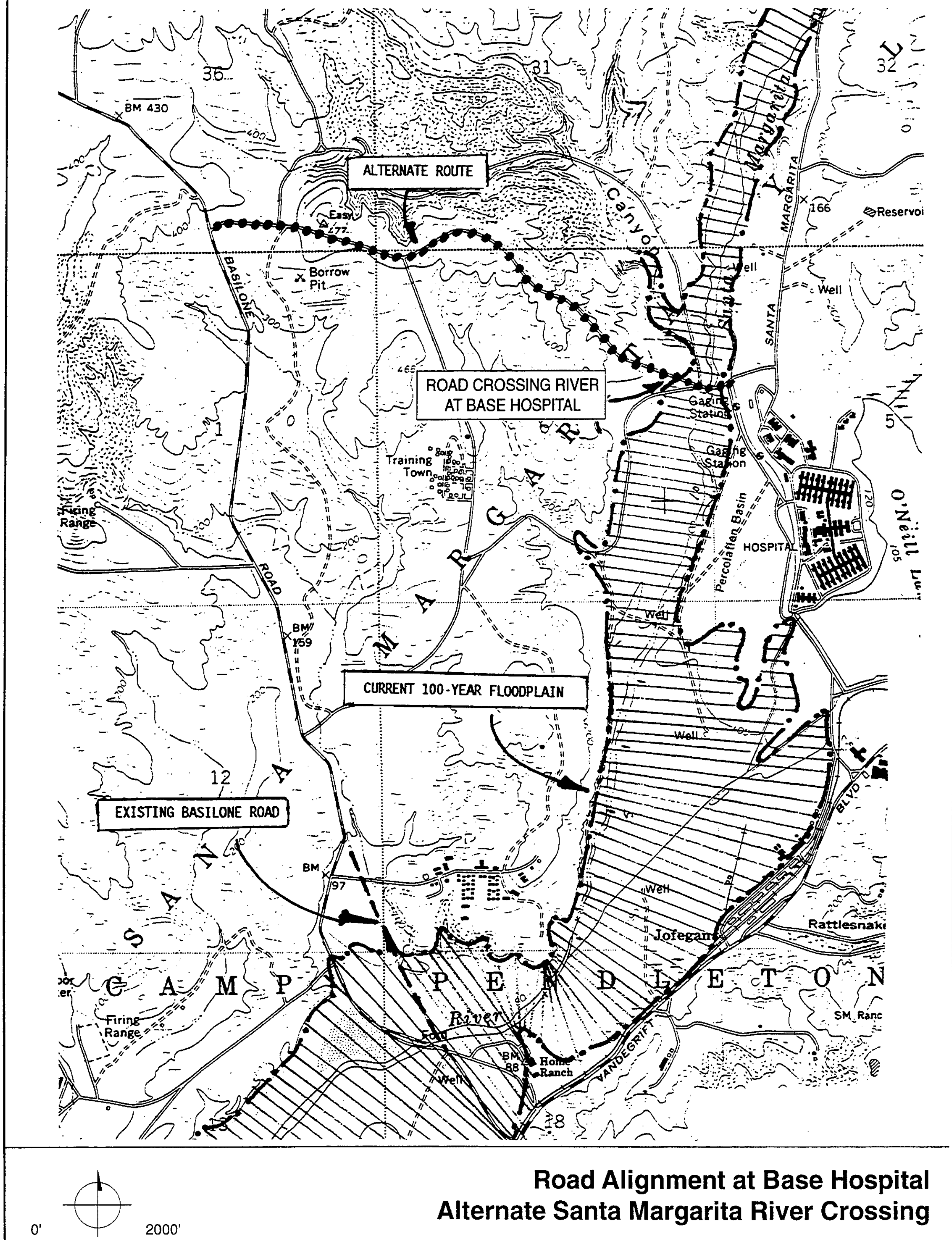
Basilone Road Bridge - East Curve Alignment. This alignment avoids flight pattern intrusion and the need for a traffic control system. The East Curve Alignment would relocate the south roadway approach to the bridge to the east. This would locate the road bridge outside of the MCAS Camp Pendleton Approach-Departure Clearance Surface (Criterion 2B). The alignment would minimize impacts to biological resources by locating in proximity to the existing alignment for Basilone Road (Criterion 3).

Result of Criteria Evaluation - Alternative Retained. The Basilone Road - East Curve alignment is an alternative retained for further analysis in this EIS.

Rattlesnake Canyon Road Alignment. The Rattlesnake Canyon Road Alignment realigns Basilone Road approximately 1,200 feet to the northeast of the existing alignment and the Santa Margarita Ranch House complex. This alignment would require a significantly longer bridge crossing, approximately 2,000 feet, to connect Vandegrift Boulevard and Basilone Road. This long bridge span would require 16 bents and 14 piers within the riverbed. This alignment also requires the development of approximately 2,500 feet of new roadway across the bluff in the Vado Del Rio (25) Area to connect with the north end of Basilone Road. Additional grading would be required on the south side of the river for approximately 2,000 feet to connect the south roadway approach with Vandegrift Boulevard (Winzler and Kelly, 1996).

Analysis of Selection Criteria. The Rattlesnake Canyon Road Alignment would not minimize the bridge span required to cross the Santa Margarita River and would require a 2,000-foot-long bridge and a 2,500-foot-long connector road to Basilone Road (Criterion 1). This alignment would support the operations of MCB Camp Pendleton/MCAS Camp Pendleton (Criterion 2A). The Rattlesnake Canyon Road bridge would not be located within the MCAS Camp Pendleton Approach-Departure Clearance Imaginary Surface. This alternative would not result in the intrusion of high profile vehicles into the MCAS Camp Pendleton Approach-Departure Clearance Surface (Criterion 2B). The project would not minimize impacts to biological resources (Criterion 3) as the bridge and roadway approaches would disturb approximately 6 acres of high quality riparian and upland habitats adjoining the Santa Margarita River (Value Engineering Team Study, 1995).

Result of Criteria Evaluation: Alternative Retained. The Rattlesnake Canyon Road alignment of the Basilone Road Bridge replacement is an alternative retained for further analysis in this EIS.



Road Alignment at Base Hospital
Alternate Santa Margarita River Crossing

Figure C-9

Hospital Road Alignment. The Hospital Road Alignment would provide a road bridge crossing at a location upstream of the existing Basilone Road Bridge (Figure C-9). At locations upstream of the existing bridge between the O'Neill Lake Diversion and the De Luz Canyon confluence, the Santa Margarita River narrows and has widths of approximately 500 feet. The Hospital Road Alignment would require a short bridge span of 500 feet across the river near the MCB Camp Pendleton Hospital.

The Hospital Road Alignment would require major widening of Hospital Road and Santa Margarita Road to accommodate increased traffic (MCB Camp Pendleton Traffic Engineering Study, August 1995). In addition, this alignment would require the construction of approximately 1 mile of new road on the north side of the river to connect with Basilone Road. This new connector to Basilone Road would divide, segregate, and isolate two highly used training areas (Kilo Two and India) specifically designated for multiple MCB Camp Pendleton training activities. The type of training activities include, but are not limited to, artillery firing areas (AFA), Military Operations in Urban Terrain (Combat Town), small unit tactics, combat vehicle operations training, scouting and patrolling, compass and land navigation training, basic military skills training, control and maneuver of combat units up to brigade size, objective areas for heliborne operations and in-land maneuver following amphibious operations (MCB Camp Pendleton Operations and Training Department, 1996).

Analysis of Selection Criteria. The Hospital Road Alignment would minimize the required bridge span across the Santa Margarita River with a 500-foot bridge length (Criterion 1). According to the ACOE floodplain analysis, the Hospital Road Alignment bridge crossing was hydraulically preferred to the other alternatives. This alignment would not support MCB Camp Pendleton combat training operations (Criterion 2A). This new connector would divide, segregate, and isolate the Kilo Two Training Area from the India Training Area and would adversely impact the following training activities. A multiple lane road carrying hundreds of vehicles per hour would preclude low altitude paradrop operations into the Basilone Drop Zone due to aircraft safety considerations and prevailing winds. The new road would be within the surface danger zones of AFAs 23 and 24 which would end their use as AFAs. Tactical military training troop movement to/from the Kilo Two to the India Training Area would be forced into tactically unsound maneuvers when they cross the new road. Several "tank crossings" would be required on the connector road to allow for the passage of tracked vehicles. The new road would interfere with future training plans that include in-land maneuver and new firing ranges. The Kilo Two and India Training Areas are utilized by tens-of-thousands of Marines and other Armed Services members annually. Dividing, segregating, and isolating these two areas would deprive unit commanders of contiguous training areas, reduce their flexibility in planning and executing training operations, and ultimately negatively impact combat readiness of their units.

The Hospital Road Alignment would lengthen the trip for motorists traveling from areas north on the Santa Margarita River and points south of the existing Basilone Road on Vandegrift by approximately 4.1 miles. This alignment would not provide a direct link between Basilone Road and Vandegrift Boulevard and would be less functional than other road alignments (Criterion 2A).

The bridge for the Hospital Road Alignment would not be located within the MCAS Camp Pendleton Approach- Departure Clearance Surface (Criterion 2B). The project would not minimize impacts to biological resources as the bridge and roadway approaches would disturb 2 acres of low quality habitat and 4 acres of high quality habitat (Value Engineering Team Study, 1995).

Result of Criteria Evaluation: Alternative Eliminated. The Hospital Road Alignment was eliminated because this alignment would disrupt and conflict with military training activities (Criterion 2A). This alignment would conflict with MCB Camp Pendleton/MCAS Camp Pendleton operations and would not adhere with the MCB Camp Pendleton/MCAS Camp Pendleton mission (MCB Camp Pendleton, Public Works Office and MCB Camp Pendleton Traffic Engineering Study, August 1995). In addition, the Hospital Road Alignment would disturb 2 acres of low quality habitat and 4 acres of high quality habitat (Value Engineering Team Study, 1995).

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APPENDIX D

APPENDIX D

BIOLOGICAL RESOURCES

APPENDIX D

BIOLOGICAL RESOURCES

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APPENDIX D

SENSITIVE PLANT SPECIES DETECTED ONSITE OR KNOWN FROM THE REGIONAL AREA
(Updated 1996 Taxonomy and Status)

Species	Status			
	Federal	State	CNPS	Likelihood of Occurrence/Notes
Allium munzi (= *Allium fimbriatum* var. *munzii*) Munz's onion	SC	CT	1B	Low; grassy openings in coastal sage scrub; only nine populations known in the county
Ambrosia pumila San Diego ambrosia	SC	- - -	1B	High; coastal sage scrub, valley and foothill grassland
Aphanisma blitoides Aphanisma	SC	- - -	1B	Moderate; coastal bluff scrub, coastal sage scrub, alkaline areas
Astragalus tener var. *titi* Coastal dunes milk-vetch	FPE	CE	1B	Low; coastal dunes, alkaline areas
Atriplex pacifica Southcoast saltbush	SC	- - -	1B	Moderate; coastal scrub, coastal bluff scrub and playas
Baccharis vanessae Encinitas coyote bush	FPE	CE	1B	Low; chaparral
Brodiaea filifolia Thread-leaved brodiaea	FPT	CE	1B	Low; valley and foothill grasslands, vernal pools
Brodiaea orcuttii Orcutt's brodiaea	SC	- - -	1B	Low; closed-cone coniferous forest, meadows, cismontane woodland, valley and foothill grassland, vernal pools
Caulanthus simulans Payson's jewelflower	SC	- - -	4	Low; chaparral, coastal sage scrub
Ceanothus verrucosus Wart-stemmed ceanothus	SC	- - -	2	Low; chaparral
Chorizanthe polygonoides ssp. *longispina* Knot-weed spineflower	SC	- - -	1B	Moderate; chaparral, coastal sage scrub, valley grasslands; clay
Comarostaphylis diversifolia ssp. *diversifolia* Summer holly	SC	- - -	1B	Low; chaparral
Cordylanthus maritimus ssp. *maritimus* Saltmarsh birds beak	FE	CE	1B	Low; saltmarsh

Sensitive Plant Species Detected Onsite or Known from the Regional Area (Continued)

Species	Status			
	Federal	State	CNPS	Likelihood of Occurrence/Notes
Dudleya blochmaniae ssp. *blochmaniae* Blochman's dudleya	SC	---	1B	Moderate; chaparral, coastal sage scrub (Torrey sandstone)
Dudleya multicaulis Many-stemmed liveforever	SC	---	1B	Low; chaparral, coastal sage scrub, valley and foothill grassland
Dudleya viscida Sticky dudleya	SC	---	1B	Detected; identified at the mouth of the Santa Margarita River which is outside of the project limits; coastal sage scrub habitat
Eryngium aristulatum var. *parishii* San Diego button celery	FE	CE	1B	Low; vernal pools, marshes
Ferocactus viridescens Coast barrel cactus	SC	---	2	Moderate; chaparral, coastal sage scrub, valley and foothill grassland
Harpogonella palmeri Palmer's grapplinghook	SC	---	2	Moderate; chaparral, coastal sage scrub, valley and foothill grassland
Lilium humboldtii ssp. *ocellatum* Ocellated Humboldt lily	SC	---	4	Low; cismontane woodland, coniferous forest, chaparral
Lotus nuttallianus Nuttall's lotus	SC	---	1B	Moderate; coastal dunes, coastal sage scrub
Monardella hypoleuca ssp. *lanata* Felt-leaved rock-mint	SC	---	1B	Low; chaparral
Muilla clevelandii Cleveland's goldenstar	SC	---	1B	Low; vernal pools, chaparral, coastal sage scrub, valley and foothill grasslands
Myosurus minimus ssp. *apus* Little mousetail	SC	---	3	Low; vernal pools
Navarretia fossalis Prostrate navarretia	SC	---	1B	Low; vernal pools
Orcuttia californica California orcuttia	FE	CE	1B	Low; vernal pools
Quercus dumosa Nuttall's scrub oak	SC	---	1B	Moderate; coastal chaparral
Rorippa gambellii Gambel's watercress	FE	CT	1B	Low; marshes and swamps
Tetracoccus dioicus Parry's tetracoccus	SC	---	1B	Moderate; chaparral, coastal sage scrub

Sensitive Plant Species Detected Onsite or Known from the Regional Area (Continued)

Species	Status			
	Federal	**State**	**CNPS**	**Likelihood of Occurrence/Notes**
INSECTS				
Cicindela latesignata obliviosa Oblivious tiger beetle	SC	---	---	Low; coastal sand dunes
Danaus plexippus Monarch butterfly	---	---	---	Moderate
Euphyes vestris harbisoni Harbison's dune skipper	SC	---	---	Low; obligate relationship with San Diego sedge (*Carex spissa*)
Lycaena hermes Hermes copper butterfly	----	---	---	Low; status unknown, larval food plant is buckthorn (*Rhamnus crocea*).
Panoquina errans Salt marsh skipper	SC	---	---	Low; larval food plant is desert salt grass (*Distichlis spicata* ssp. *spicata)*
Pseudocopaeodes eunus eunus Wandering skipper	SC	---	---	Low; larval food plant is desert salt grass (*Distichlis spicata* ssp. *spicata)*
FISH				
Eucyclogobius newberryi Tidewater Goby	FE	CE	---	Low; restricted to brackish water habitats in the upper portions of coastal lagoons
Gila orcutti Arroyo chub	---	SC	---	Low; found upstream of Lake O'Neil, not within the project limits
CRUSTACEANS				
Streptocephalus newberryi Riverside fairy shrimp	FE	---	---	Low; found in vernal pools
Linderiella occidentalis Californian Linderiella	FPE	---	---	Low; found in seasonally astatic pools and ponds in old alluvial soils underlain by hardpan, grass-bottomed and containing clear though often tea-colored water

Sensitive Plant Species Detected Onsite or Known from the Regional Area (Continued)

Species	Status			
	Federal	State	CNPS	Likelihood of Occurrence/Notes
AMPHIBIANS				
Bufo microscaphus californicus Arroyo southwestern toad	FE	SC	- - -	Detected; observed throughout the river habitat of the Santa Margarita River in 1995
Rana aurora draytonii California red legged frog	E	SC	SDHS	Low; shrubby riparian vegetation associated with still or slow moving water over 2.3 feet deep
Scaphiopus hammondii Western spadefoot	- - -	SC	- - -	Detected; washes and alkaline sinks
REPTILES				
Clemmys marmorata pallida Southwestern pond turtle	SC	SC	- - -	Low; detected on Camp Pendelton outside of the project limits (Ysidora basin)
Cnemidophorus hyperythrus beldingi Orange-throated whiptail	SC	SC	SDHS	High; washes and other sandy areas where there are patches of brush and rocky hillsides; coastal chaparral, thornscrub and streamside growth
Cnemidophorus tigris musculatus Coastal western whiptail	SC	- - -	- - -	High; woodlands, dense chaparral, brushy areas
Coleonyx variegatus abottii San Diego banded gecko	SC	- - -	- - -	Low; desert habitat
Crotalus ruber ruber Northern red diamond rattlesnake	SC	SC	- - -	High; rocky areas, coastal sage and chaparral
Diadophis punctatus similis San Diego ringneck snake	SC	- - -	- - -	Moderate; moist habitats such as oak woodlands and canyon bottoms
Lampropeltis zonata pulchra San Diego mountain kingsnake	SC	SC	- - -	Low; rocky streamsides in wooded areas
Lichaura trivirgata roseofusca Coastal rosy boa	SC	- - -	- - -	Moderate; rocky chaparral slopes and canyons up to 4500 feet
Phyronosoma coronatum blainvillei San Diego horned lizard	SC	SC	SDHS	Moderate; coastal sage scrub and chaparral
Salvadora hexalepis virgultea Coast patch nosed snake	SC	SC	- - -	Low; chaparral and sage scrub

Sensitive Plant Species Detected Onsite or Known from the Regional Area (Continued)

Species	Status			
	Federal	State	CNPS	Likelihood of Occurrence/Notes
Thamnophis couchi hammondi Two-striped garter snake	---	SC	SDHS	Detected; within project site
BIRDS				
Agelaius tricolor Tri-colored blackbird	SC	SC	---	Moderate; freshwater marshes
Aimophila ruficeps canescens Southern California rufous-crowned sparrow	SC	SC	EVE	Detected; a few were observed in the grassy disturbed areas near Rifle Range Road during 1995 surveys
Amphispiza belli belli Bell's sage sparrow	SC	SC	BL	Detected; observed in the chaparral adjacent to the Santa Margarita floodplain
Campylorhynchus brunneicapillus sandiegoense Coastal cactus wren	SC	SC	---	High; arid brush, cactus, yucca
Charadrius alexandrinus nivosus Western snowy plover	FT	SC	BL	Detected; nesting along the beaches at the mouth of the Santa Margarita river in 1995, do not nest within the project limits
Charadrius montanus Mountain plover	SC	SC	---	Low; local winter visitor, grasslands and agricultural fields
Childonias niger surinamensis Black tern	SC	SC	---	Low; rare spring migrant and non-breeding visitor found around brackish lagoons, estuaries and freshwater ponds
Circus cyaneus Northern harrier	---	SC	BL	High; marshes, fields and prairies
Elaneus caeruleus Black-shouldered kite	---	CFP	---	Detected; forages on-site along banks of the Santa Margarita river and adjacent grassland habitat
Epidomax traillii extimus Southwestern willow flycatcher	FE	CE	---	Detected; 3 pairs observed within the project vicinity
Eremophila alpestirs actia California horned lark	SC	SC	---	Detected; observed in the landscaped grass on the west end of the runway and on the runway itself at the Marine Air Station during 1995 spring surveys

Sensitive Plant Species Detected Onsite or Known from the Regional Area (Continued)

Species	Status			
	Federal	State	CNPS	Likelihood of Occurrence/Notes
Lateralllus jamaicensis coturniculus Black rail	SC	CT	---	Moderate; saltmarsh habitat
Numenius americanus Long-billed curlew	SC	SC	---	Detected; as a spring visitor at the mouth of the Santa Margarita river during 1995 surveys, but was not observed within the project limits
Passerculus sandwichensis beldingi Belding's savannah sparrow	SC	CE	---	Detected; foraging in the pickleweed near the mouth of the Santa Margarita river in 1995 surveys, but was not observed within the project limits
Passerculus sandwichensis rostratus Large-billed savannah sparrow	SC	SC	---	Low; winter visitors in marshes and beaches.
Pelecanus occidentalis californicus Brown pelican	FE	CE	---	Detected; along the coastline in 1995 surveys, but was not observed within the project limits
Polioptila californica californica Coastal California gnatcatcher	FT	SC	---	Detected; thirty gnatcatcher localities recorded in the coastal sage scrub adjacent to the Santa Margarita floodplain
Rallus longirostris levipes Light-footed clapper rail	FE	CE	BL	Low; nests in typha in salt marshes and brackish marshes
Riparia riparia Bank swallow	---	CT	---	Low; nests colonial in sand banks
Sterna antillarum browni California least tern	FE	CE	---	Detected; nesting along the beaches at the mouth of the Santa Margarita river in 1995, do not nest within the project limits, but could forage within them

Sensitive Plant Species Detected Onsite or Known from the Regional Area (Continued)

Species	Status			
	Federal	State	CNPS	Likelihood of Occurrence/Notes
Sterna elegans Elegant tern	SC	SC	---	Detected: feeding at the mouth of the Santa Margarita river in 1995, do not nest within the project limits
Vireo bellii pusillus Least Bell's vireo	FE	CE	---	Detected; 235 pairs observed within the project limits
MAMMALS				
Dipodmys stephensi Stephen's kangaroo rat	FE	CT	---	Detected; on Camp Pendelton but not within project limits; prefers annual grassland for habitat
Euderma maculata Spotted bat	SC	SC	MSSC	Low; cliff dweller in canyons
Eumops perotis californicus California mastiff bat	SC	SC	MSSC	Low; rocky areas and large boulders for roosting
Lepus californicus bennettii San Diego black-tailed jackrabbit	SC	SC	---	Moderate; open habitats including coastal sage scrub, chaparral, grasslands and open disturbed areas
Macrotus californicus California leaf nosed bat	SC	SC	MSSC	Low; low lying deserts and coastal basins
Myotis lucifrugus occultus Occult little brown bat	SC	---	MSSC	Low; forested areas
Neotoma lepida intermedia San Diego desert woodrat	SC	SC	---	Low; open chaparral and coastal sage scrub
Onychomys torridus ramona Southern grasshopper mouse	SC	SC	---	Low; desert transition zone
Perognathus fallax fallax San Diego pocket mouse	SC	---	---	Moderate; open areas of coastal sage scrub and weedy growth often on sandy substrates
Perognathus fallax pallidus Pallid San Diego pocket mouse	SC	---	---	Low; open sandy, weed grown areas in the low desert and foothills
Perognathus longimembris pacificus Pacific pocket mouse	FE	SC	---	Detected; on MCBCP, but is limited to the coastal areas (3-4 km from the coast); was not observed within the project area

SENSITIVITY CODES

FEDERAL LISTED AND CANDIDATE SPECIES

FE	=	Federally listed, endangered
FT	=	Federally listed, threatened
PT	=	Proposed for listing as federal listing as threatened
PE	=	Proposed for listing as federal listing as endangered
SC	=	Species of Special Concern (Formally either a C1 or C2 Category Candidate for Listing)

STATE LISTED SPECIES

CE	=	State listed, endangered
CT	=	State listed, threatened
CR	=	State listed, rare
CFP	=	California Fully Protected (CDFG)
SC	=	Species of Special Concern (CDFG)

CALIFORNIA NATIVE PLANT SOCIETY

1B	=	Species rare, threatened, or endangered in California and elsewhere. These species are eligible for state listing.
2	=	Species rare, threatened, or endangered in California but which are more common elsewhere. These species are eligible for state listing.
3	=	Species for which more information is needed. Distribution, endangerment, and/or taxonomic information is needed.
4	=	A watch list of species of limited distribution. These species need to be monitored for changes in the status of their populations.

OTHER

SDHS	=	Considered threatened by San Diego Herpetological Society
BL	=	Audubon Society Blue List (Tate 1986), a listing of bird species considered sensitive because their populations have been decreasing and they have suffered habitat loss
EVE	=	Everett (1979)
MSSC	=	Mammalian Species of Special Concern

Vegetation and Habitat Impacts by Project Component

ALTERNATIVE 3A

Permanent Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	3.2		0.2		3.4
Diegan Coastal Sage Scrub	0.0		0.8		0.8
Freshwater Marsh	0.0		0.0		0.0
Grass-Forb Mix	4.1		0.6		4.7
Mixed Willow Exotic	4.1		0.0		4.1
Riparian Scrub	0.0		0.1		0.1
Riparian Woodland	0.0		0.0		0.0
Tamarisk	0.0		0.0		0.0
Water, Gravel, Mud	1.7		0.0		1.7
Subtotal Vegetation/Habitat	13.1		1.7		14.8
Disturbed/Developed	11.2		2.5		13.7
Total Permanent Impacts	24.3	0.0	4.2	0.0	28.5

Temporary Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	6.4		1.4		7.8
Diegan Coastal Sage Scrub	0.0		0.4		0.4
Freshwater Marsh	0.0		0.0		0.0
Grass-Forb Mix	10.4		0.4		10.8
Mixed Willow Exotic	8.6		0.0		8.6
Riparian Scrub	0.0		0.4		0.4
Riparian Woodland	0.0		0.0		0.0
Tamarisk	0.0		0.0		0.0
Water, Gravel, Mud	3.2		0.3		3.5
Subtotal Vegetation/Habitat	28.6	0.0	2.9	0.0	31.5
Disturbed/Developed	9.8		1.8		11.6
Total Temporary Impacts	38.4	0.0	4.7	0.0	43.1
Total Permanent and Temporary Impacts	62.7	0.0	8.9	0.0	71.6

Vegetation and Habitat Impacts by Project Component

ALTERNATIVE 3B

Permanent Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	3.2		0.9		4.1
Diegan Coastal Sage Scrub	0.0		1.2		1.2
Freshwater Marsh	0.0		0.0		0.0
Grass-Forb Mix	4.1		0.6		4.7
Mixed Willow Exotic	4.1		0.1		4.2
Riparian Scrub	0.0		0.5		0.5
Riparian Woodland	0.0		0.0		0.0
Tamarisk	0.0		0.0		0.0
Water, Gravel, Mud	1.7		0.2		1.9
Subtotal Vegetation/Habitat	13.1	0.0	3.5	0.0	16.6
Disturbed/Developed	11.2		2.0		13.2
Total Permanent Impacts	24.3	0.0	5.5	0.0	29.8

Temporary Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	6.4		1.4		7.8
Diegan Coastal Sage Scrub	0.0		0.5		0.5
Freshwater Marsh	0.0		0.0		0.0
Grass-Forb Mix	10.4		0.4		10.8
Mixed Willow Exotic	8.6		0.1		8.7
Riparian Scrub	0.0		0.5		0.5
Riparian Woodland	0.0		0.0		0.0
Tamarisk	0.0		0.0		0.0
Water, Gravel, Mud	3.2		0.5		3.7
Subtotal Vegetation/Habitat	28.6	0.0	3.4	0.0	32.0
Disturbed/Developed	9.8		2.2		12.0
Total Temporary Impacts	38.4	0.0	5.6	0.0	44.0
Total Permanent and Temporary Impacts	62.7	0.0	11.1	0.0	73.8

Vegetation and Habitat Impacts by Project Component

ALTERNATIVE 3C

Permanent Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	3.2		0.0		3.2
Diegan Coastal Sage Scrub	0.0		2.3		2.3
Freshwater Marsh	0.0		0.0		0.0
Grass-Forb Mix	4.1		0.9		5.0
Mixed Willow Exotic	4.1		1.0		5.1
Riparian Scrub	0.0		0.8		0.8
Riparian Woodland	0.0		0.0		0.0
Tamarisk	0.0		0.0		0.0
Water, Gravel, Mud	1.7		0.2		1.9
Subtotal Vegetation/Habitat	13.1		5.2		18.3
Disturbed/Developed	11.2		2.4		13.6
Total Permanent Impacts	24.3	0.0	7.6	0.0	31.9

Temporary Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	6.4		0.0		6.4
Diegan Coastal Sage Scrub	0.0		2.4		2.4
Freshwater Marsh	0.0		0.0		0.0
Grass-Forb Mix	10.4		1.3		11.7
Mixed Willow Exotic	8.6		2.5		11.1
Riparian Scrub	0.0		0.4		0.4
Riparian Woodland	0.0		0.0		0.0
Tamarisk	0.0		0.0		0.0
Water, Gravel, Mud	3.2		0.6		3.8
Subtotal Vegetation/Habitat	28.6	0.0	7.2	0.0	35.8
Disturbed/Developed	9.8		2.4		12.2
Total Temporary Impacts	38.4	0.0	9.6	0.0	48.0
Total Permanent and Temporary Impacts	62.7	0.0	17.2	0.0	79.9

Vegetation and Habitat Impacts by Project Component

ALTERNATIVE 1A

Permanent Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	6.5	0.2	0.2	0.2	7.1
Diegan Coastal Sage Scrub	0.0	0.0	0.8	20.3	21.1
Freshwater Marsh	0.3	0.0	0.0	0.0	0.3
Grass-Forb Mix	8.2	6.7	0.6	0.0	15.5
Mixed Willow Exotic	13.1	0.8	0.0	0.0	13.9
Riparian Scrub	0.5	1.7	0.1	3.1	5.4
Riparian Woodland	0.8	0.0	0.0	0.0	0.8
Tamarisk	1.6	0.0	0.0	0.0	1.6
Water, Gravel, Mud	4.5	0.0	0.0	1.2	5.7
Subtotal Vegetation/Habitat	35.5	9.4	1.7	24.8	71.4
Disturbed/Developed	13.4	0.0	2.5	0.0	15.9
Total Permanent Impacts	48.9	9.4	4.2	24.8	87.3

Temporary Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	6.3	0.1	1.4		7.8
Diegan Coastal Sage Scrub	0.0	0.0	0.4		0.4
Freshwater Marsh	0.3	0.0	0.0		0.3
Grass-Forb Mix	10.9	5.4	0.4		16.7
Mixed Willow Exotic	12.5	0.6	0.0		13.1
Riparian Scrub	0.8	1.1	0.4		2.3
Riparian Woodland	0.9	0.0	0.0		0.9
Tamarisk	2.8	0.0	0.0		2.8
Water, Gravel, Mud	4.0	0.0	0.3		4.3
Subtotal Vegetation/Habitat	38.5	7.2	2.9	0.0	48.6
Disturbed/Developed	11.7	0.2	1.8		13.7
Total Temporary Impacts	50.2	7.4	4.7	0.0	62.3
Total Permanent and Temporary Impacts	99.1	16.8	8.9	24.8	149.6

Vegetation and Habitat Impacts by Project Component

ALTERNATIVE 1B

Permanent Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	6.5	0.2	0.9	0.2	7.8
Diegan Coastal Sage Scrub	0.0	0.0	1.2	20.3	21.5
Freshwater Marsh	0.3	0.0	0.0	0.0	0.3
Grass-Forb Mix	8.2	6.7	0.6	0.0	15.5
Mixed Willow Exotic	13.1	0.8	0.1	0.0	14.0
Riparian Scrub	0.5	1.7	0.5	3.1	5.8
Riparian Woodland	0.8	0.0	0.0	0.0	0.8
Tamarisk	1.6	0.0	0.0	0.0	1.6
Water, Gravel, Mud	4.5	0.0	0.2	1.2	5.9
Subtotal Vegetation/Habitat	35.5	9.4	3.5	24.8	73.2
Disturbed/Developed	13.4	0.0	2.0	0.0	15.4
Total Permanent Impacts	48.9	9.4	5.5	24.8	88.6

Temporary Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	6.3	0.1	1.4		7.8
Diegan Coastal Sage Scrub	0.0	0.0	0.5		0.5
Freshwater Marsh	0.3	0.0	0.0		0.3
Grass-Forb Mix	10.9	5.4	0.4		16.7
Mixed Willow Exotic	12.5	0.6	0.1		13.2
Riparian Scrub	0.8	1.1	0.5		2.4
Riparian Woodland	0.9	0.0	0.0		0.9
Tamarisk	2.8	0.0	0.0		2.8
Water, Gravel, Mud	4.0	0.0	0.5		4.5
Subtotal Vegetation/Habitat	38.5	7.2	3.4	0.0	49.1
Disturbed/Developed	11.7	0.2	2.2		14.1
Total Temporary Impacts	50.2	7.4	5.6	0.0	63.2
Total Permanent and Temporary Impacts	99.1	16.8	11.1	24.8	151.8

Vegetation and Habitat Impacts by Project Component

ALTERNATIVE 1C

Permanent Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	6.5	0.2	0.0	0.2	6.9
Diegan Coastal Sage Scrub	0.0	0.0	2.3	20.3	22.6
Freshwater Marsh	0.3	0.0	0.0	0.0	0.3
Grass-Forb Mix	8.2	6.7	0.9	0.0	15.8
Mixed Willow Exotic	13.1	0.8	1.0	0.0	14.9
Riparian Scrub	0.5	1.7	0.8	3.1	6.1
Riparian Woodland	0.8	0.0	0.0	0.0	0.8
Tamarisk	1.6	0.0	0.0	0.0	1.6
Water, Gravel, Mud	4.5	0.0	0.2	1.2	5.9
Subtotal Vegetation/Habitat	35.5	9.4	5.2	24.8	74.9
Disturbed/Developed	13.4	0.0	2.4	0.0	15.8
Total Permanent Impacts	48.9	9.4	7.6	24.8	90.7

Temporary Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	6.3	0.1	0.0		6.4
Diegan Coastal Sage Scrub	0.0	0.0	2.4		2.4
Freshwater Marsh	0.3	0.0	0.0		0.3
Grass-Forb Mix	10.9	5.4	1.3		17.6
Mixed Willow Exotic	12.5	0.6	2.5		15.6
Riparian Scrub	0.8	1.1	0.4		2.3
Riparian Woodland	0.9	0.0	0.0		0.9
Tamarisk	2.8	0.0	0.0		2.8
Water, Gravel, Mud	4.0	0.0	0.6		4.6
Subtotal Vegetation/Habitat	38.5	7.2	7.2	0.0	52.9
Disturbed/Developed	11.7	0.2	2.4		14.3
Total Temporary Impacts	50.2	7.4	9.6	0.0	67.2
Total Permanent and Temporary Impacts	99.1	16.8	17.2	24.8	157.9

Vegetation and Habitat Impacts by Project Component

ALTERNATIVE 2A

Permanent Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	2.4	0.4	0.2	0.2	3.2
Diegan Coastal Sage Scrub	0.0	0.0	0.8	20.3	21.1
Freshwater Marsh	0.0	0.5	0.0	0.0	0.5
Grass-Forb Mix	2.3	8.9	0.6	0.0	11.8
Mixed Willow Exotic	3.0	7.2	0.0	0.0	10.2
Riparian Scrub	0.0	1.7	0.1	3.1	4.9
Riparian Woodland	0.2	0.0	0.0	0.0	0.2
Tamarisk	0.6	0.0	0.0	0.0	0.6
Water, Gravel, Mud	1.4	0.0	0.0	1.2	2.6
Subtotal Vegetation/Habitat	9.9	18.7	1.7	24.8	55.1
Disturbed/Developed	5.5	0.0	2.5	0.0	8.0
Total Permanent Impacts	15.4	18.7	4.2	24.8	63.1

Temporary Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	4.9	0.1	1.4		6.4
Diegan Coastal Sage Scrub	0.0	0.0	0.4		0.4
Freshwater Marsh	0.0	0.2	0.0		0.2
Grass-Forb Mix	7.2	6.4	0.4		14.0
Mixed Willow Exotic	7.2	3.6	0.0		10.8
Riparian Scrub	0.0	1.1	0.4		1.5
Riparian Woodland	0.7	0.0	0.0		0.7
Tamarisk	2.2	0.0	0.0		2.2
Water, Gravel, Mud	3.4	0.0	0.3		3.7
Subtotal Vegetation/Habitat	25.6	11.4	2.9	0.0	39.9
Disturbed/Developed	10.5	0.2	1.8		12.5
Total Temporary Impacts	36.1	11.6	4.7	0.0	52.4
Total Permanent and Temporary Impacts	51.5	30.3	8.9	24.8	115.5

Vegetation and Habitat Impacts by Project Component

ALTERNATIVE 2B

Permanent Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	2.4	0.4	0.9	0.2	3.9
Diegan Coastal Sage Scrub	0.0	0.0	1.2	20.3	21.5
Freshwater Marsh	0.0	0.5	0.0	0.0	0.5
Grass-Forb Mix	2.3	8.9	0.6	0.0	11.8
Mixed Willow Exotic	3.0	7.2	0.1	0.0	10.3
Riparian Scrub	0.0	1.7	0.5	3.1	5.3
Riparian Woodland	0.2	0.0	0.0	0.0	0.2
Tamarisk	0.6	0.0	0.0	0.0	0.6
Water, Gravel, Mud	1.4	0.0	0.2	1.2	2.8
Subtotal Vegetation/Habitat	9.9	18.7	3.5	24.8	56.9
Disturbed/Developed	5.5	0.0	2.0	0.0	7.5
Total Permanent Impacts	15.4	18.7	5.5	24.8	64.4

Temporary Impacts	Levee	Spur Dike	Bridge	Other	Total
Arundo	4.9	0.1	1.4		6.4
Diegan Coastal Sage Scrub	0.0	0.0	0.5		0.5
Freshwater Marsh	0.0	0.2	0.0		0.2
Grass-Forb Mix	7.2	6.4	0.4		14.0
Mixed Willow Exotic	7.2	3.6	0.1		10.9
Riparian Scrub	0.0	1.1	0.5		1.6
Riparian Woodland	0.7	0.0	0.0		0.7
Tamarisk	2.2	0.0	0.0		2.2
Water, Gravel, Mud	3.4	0.0	0.5		3.9
Subtotal Vegetation/Habitat	25.6	11.4	3.4	0.0	40.4
Disturbed/Developed	10.5	0.2	2.2		12.9
Total Temporary Impacts	36.1	11.6	5.6	0.0	53.3
Total Permanent and Temporary Impacts	51.5	30.3	11.1	24.8	117.7

Vegetation and Habitat Impacts by Project Component

ALTERNATIVE 2C

Permanent Impacts	**Levee**	**Spur Dike**	**Bridge**	**Other**	**Total**
Arundo	2.4	0.4	0.0	0.2	3.0
Diegan Coastal Sage Scrub	0.0	0.0	2.3	20.3	22.6
Freshwater Marsh	0.0	0.5	0.0	0.0	0.5
Grass-Forb Mix	2.3	8.9	0.9	0.0	12.1
Mixed Willow Exotic	3.0	7.2	1.0	0.0	11.2
Riparian Scrub	0.0	1.7	0.8	3.1	5.6
Riparian Woodland	0.2	0.0	0.0	0.0	0.2
Tamarisk	0.6	0.0	0.0	0.0	0.6
Water, Gravel, Mud	1.4	0.0	0.2	1.2	2.8
Subtotal Vegetation/Habitat	9.9	18.7	5.2	24.8	58.6
Disturbed/Developed	5.5	0.0	2.4	0.0	7.9
Total Permanent Impacts	15.4	18.7	7.6	24.8	66.5

Temporary Impacts	**Levee**	**Spur Dike**	**Bridge**	**Other**	**Total**
Arundo	4.9	0.1	0.0		5.0
Diegan Coastal Sage Scrub	0.0	0.0	2.4		2.4
Freshwater Marsh	0.0	0.2	0.0		0.2
Grass-Forb Mix	7.2	6.4	1.3		14.9
Mixed Willow Exotic	7.2	3.6	2.5		13.3
Riparian Scrub	0.0	1.1	0.4		1.5
Riparian Woodland	0.7	0.0	0.0		0.7
Tamarisk	2.2	0.0	0.0		2.2
Water, Gravel, Mud	3.4	0.0	0.6		4.0
Subtotal Vegetation/Habitat	25.6	11.4	7.2	0.0	44.2
Disturbed/Developed	10.5	0.2	2.4		13.1
Total Temporary Impacts	36.1	11.6	9.6	0.0	57.3
Total Permanent and Temporary Impacts	51.5	30.3	17.2	24.8	123.8

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APPENDIX E

APPENDIX E

CLEAN WATER ACT

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APPENDIX E
CLEAN WATER ACT
Draft 404(b)(1) EVALUATION
PUBLIC INTEREST REVIEW

This appendix to the Draft Environmental Impact Statement (DEIS) for the Santa Margarita River Flood Control Project (MILCON Project P-010) and Basilone Road Bridge Replacement (MILCON Project P-030) constitutes a review and compliance determination according to the 404(b)(1) guidelines for the proposed work (preferred alternative) described in Chapter 2.0 of this document. Each of requirements for the 404(b)(1) evaluation has been fulfilled as part of administrative and analytical process undertaken for this DEIS and a cross-reference to appropriate sections of the DEIS is provided.

I. **Proposed Project:** *DEIS, Section 1.2 Background; Section 2.2 Description of the Proposed Action*

The Proposed Action consists of two projects to be constructed at MCB Camp Pendleton, California: the Santa Margarita River Flood Control Project, (including a levee and stormwater management system) (P-010) and the Basilone Road Bridge Replacement Project (P-030).

The Santa Margarita River Flood Control Project includes two components:

- A flood control structure (a levee) to provide protection to MCAS Camp Pendleton, the Chappo (22) Area, STP No. 3, and the Santa Margarita Ranch House complex from a flood event of up to 100-years in magnitude; and

- A stormwater management system to direct runoff from MCAS Camp Pendleton and the Chappo (22) Area into the Santa Margarita River without creating a flood hazard.

The Basilone Road Bridge Replacement Project includes:

- Replacement of a north-south circulation route across the Santa Margarita River at or in the vicinity of Basilone Road and Vandegrift Boulevard.

II. Environmental and Public Interest Factors Considered:

A. **Purpose and Need:** *DEIS, Section 1.1 Purpose and Need; Appendix C, Screening Analysis*

The U.S. Army Corps of Engineers (ACOE), Los Angeles District has identified two basic project purposes of the proposed actions and alternatives presented in this EIS: 1) to provide flood control for MCB Camp Pendleton and 2) to provide a river crossing over the Santa Margarita River in the southeast area of the base. These two purposes are not "water-dependent" since possible alternatives do exist that would provide for flood control and a river crossing without resulting in the discharge of dredged or fill material into waters of the United States. Two non-water-dependent alternatives that were considered for flood control involved the construction of a detention basin to collect and retain surface water runoff drainage, either a 162 acre basin north of Vandegrift Boulevard or a 74 acre basin south of Vandegrift Boulevard. These flood control options were eliminated and not considered practicable alternatives because they required extensive excavation that would have resulted in unacceptable levels of permanent significant impacts to biological habitats and endangered species. Two other possible non-water-dependent" alternatives included the siting of the flood control levee in upland areas closer to Vandegrift Boulevard or the relocation of MCAS Camp Pendleton and STP 3. Both of these options were also eliminated and deemed not practicable since they would have directly affected the strategic location and operations of MCAS Camp Pendleton as a Marine Training Center. In addition, the $400 million estimated cost for the relocation of MCAS Camp Pendleton and $6 million requirement for moving STP 3 would not have been fiscally feasible.

Non-water-dependent alternatives for a bridge over the Santa Margarita River would require moving the bridge to a higher elevation site such as Rattlesnake Canyon or the construction of a considerably longer span using suspension or similar engineering technologies. These alternatives were eliminated and not considered practicable because of airspace conflicts, operational requirements for airfield and flightpath safety and because of the substantial cost of a long-span bridge structure.

The overall purpose of the Santa Margarita Flood Control Project (MILCON Project P-010) is to protect USMC assets within the limit of the 100-year floodplain of the Santa Margarita River, including all of Marine Corps Air Station (MCAS) Camp Pendleton. The overall purpose of the Basilone Road Bridge Replacement (MILCON Project P-030) is to provide a permanent north-south access route across the Santa Margarita River in the southeast portion of MCB Camp Pendleton.

As part of the preparation of this Environmental Impact Statement (EIS), an alternatives screening analysis was performed to evaluate the engineering feasibility of alternative structures and facilities for both the flood control project and replacement of the Basilone

Road Bridge. Specifically, the alternatives were evaluated through the application of various siting criteria. The screening process resulted in the selection of several project alternatives for further analysis. A floodplain analysis of the Santa Margarita River was conducted by the U.S. Army Corps of Engineers (ACOE) which evaluated onbase flood control alternatives. These onbase flood control alternatives included a concrete lined channel, a soft bottom channel, a floodwall/levee, and an onbase detention dam. Additional flood control alternatives, including an expanded levee structure, were identified and developed by MCB Camp Pendleton and MCAS Camp Pendleton. A previous evaluation of an offbase dam/reservoir on De Luz Creek was reconsidered. The ACOE floodplain analysis and supporting hydrologic studies identified a levee as the most feasible and least environmentally intrusive flood control method. Three flood-control structure alignment alternatives were identified. A MCB Camp Pendleton transportation planning analysis and other engineering studies resulted in the identification of three bridge replacement alternatives. Other alternatives that were evaluated but eliminated and the rationale for their elimination are also discussed in the EIS.

The analytical conclusion of this screening evaluation process was the identification of a proposed project (Levee Alignment 3 and Bridge Alignment A) that resulted in maximum possible avoidance of adverse impacts on the aquatic ecosystem, including alternatives that are non-water dependent. The environmental evaluations performed in the preparation of this DEIS provide evidence rebutting the presumption that there are practicable non-water-dependent available that would have less adverse impacts on the aquatic ecosystem.

B. **Alternatives** *DEIS, Section 2.0 Proposed Action and Alternatives*

1. **No action:** *DEIS, Section 2.3.10 No Action Alternative*

2. **Other project designs:** *DEIS, Sections 2.3.2 through 2.3.9*

3. **Other sites**: *DEIS, Section2.4 Alternatives Considered But Eliminated from Further Analysis*

C. **Physical/chemical characteristics and anticipated changes:**

- **substrate:** *DEIS, Sections 3.1 and 4.1*

- **currents, circulation or drainage patterns:** *DEIS, Sections 3.2.2 and 4.2.1*

- **suspended particulates; turbidity:** *DEIS, Sections 3.2.3 and 4.2.2*

- **water quality:** *DEIS, Sections 3.2.3 and 4.2.2*

- **flood control functions:** DEIS, *Sections 3.2.2 and 4.2.1*

- **storm, wave and erosion buffers:** *does not apply*

- **erosion and accretion patterns:** *DEIS, Sections 3.2.2 and 4.2.1*

- **aquifer recharge:** *DEIS, Sections 3.2.2 and 4.2.1*

- **baseflow:** *DEIS, Sections 3.2.2 and 4.2.1*

For projects involving the discharge of dredged material;

- **mixing zone, in light of the depth of water at the disposal site; current velocity, direction and variability at the disposal site; degree of turbulence; water column stratification; discharge vessel speed and direction; rate of discharge; dredged material characteristics; number of discharges per unit of time; and any other relevant factors affecting rates and patterns of mixing:** *does not apply*

D. **Biological characteristics and anticipated changes:**

- **special aquatic sites (wetlands, mudflats, coral reefs, pool and riffle areas, vegetated shallows, sanctuaries and refuges, as defined in 40 CFR 230.40-45):** *DEIS, Sections 3.3 and 4.3*

- **habitat for fish and other aquatic organisms:** *DEIS, Sections 3.3 and 4.3*

- **wildlife habitat (breeding, cover, food, travel, general):** *DEIS, Sections 3.3 and 4.3*

- **endangered or threatened species:** *DEIS, Sections 3.3 and 4.3*

- **biological availability of possible contaminants in dredged or fill material, considering hydrography in relation to known or anticipated sources of contaminants; results of previous testing of material from the vicinity of the project; known significant sources of persistent pesticides from land runoff or percolation; spill records for petroleum products or designated (Section 311 of the CWA) hazardous substances; other public records of significant introduction of contaminants from industries, municipalities or other sources:** *does not apply*

E. **Human use characteristics and impacts:**

- **existing and potential water supplies; water conservation:** *DEIS Sections 3.2 and 4.2*
- **recreational or commercial fisheries:** *does not apply*
- **other water related recreation:** *does not apply*
- **aesthetics of the aquatic ecosystem:** *DEIS, Sections3.9 and 4.9*
- **parks, national and historic monuments, national seashores, wild and scenic rivers, wilderness areas, research sites, etc.:** *DEIS, Sections 3.8 and 4.8*
- **traffic/transportation patterns:** *DEIS, Sections 3.5 and 4.5*
- **energy consumption or generation:** does not apply
- **navigation:** *does not apply*
- **safety:** *DEIS Sections 3.10 and 4.10*
- **air quality:** *DEIS Sections 3.7 and 4.7*
- **noise:** *DEIS Sections 3.6 and 4.6*
- **historic properties:** *DEIS, Sections 3.8 and 4.8*
- **land use classification:** *DEIS Sections 3.4 and 4.4*
- **economics:** *does not apply*
- **prime and unique farmland (7 CFR Part 658):** *does not apply*
- **food and fiber production:** *does not apply*
- **general water quality:** *DEIS, Sections 3.2.3 and 4.2.2*
- **mineral needs:** *DEIS, Section 2.2*
- **consideration of private property:** *does not apply*

- **other:** *does not apply*

F. **Summary of secondary and cumulative effects:** *DEIS, Section 5.0*

III. **Evaluation:**

A. **Evaluation of Compliance with 404(b)(1) guidelines (restrictions on discharge, 40 CFR 230.10). (A check in a block denoted by an asterisk indicates that the project does not comply with the guidelines.)**

1) **Alternatives test:**

Yes	No		
*	X	a)	Based on the discussion in II B, are there available, practicable alternatives having less adverse impact on the aquatic ecosystem and without other significant adverse environmental consequences that do not involve discharges into "waters of the United States" or at other locations within these waters?
X	*	b)	Based on II B, if the project is in a special aquatic site and is not water-dependent, has the applicant clearly demonstrated that there are no practicable alternative sites available?

2) **Special restrictions.** Will the discharge:

Yes	No		
*	X	a)	violate state water quality standards?
*	X	b)	violate toxic effluent standards (under Section 307 of the Act)?
*	X	c)	jeopardize endangered or threatened species or their critical habitat?
*	X	d)	violate standards set by the Department of Commerce to protect marine sanctuaries?
X	*	e)	Evaluation of the information in II C and D above indicates that the proposed discharge material meets testing exclusion criteria for the following reason(s).

- based on the above information, the material is not a carrier of contaminants

3) **Other restrictions.** Will the discharge contribute to significant degradation of "waters of the U.S." through adverse impacts to:

Yes	No	
*	X	a) human health or welfare, through pollution of municipal water supplies, fish, shellfish, wildlife and special aquatic sites?
*	X	b) life states of aquatic life and other wildlife?
*	X	c) diversity, productivity and stability of the aquatic ecosystem, such as the loss of fish or wildlife habitat, or loss of the capacity of wetland to assimilate nutrients, purify water or reduce wave energy?
*	X	d) recreational, aesthetic and economic values?
X	*	4) Actions to minimize potential adverse impacts (mitigation). Will all appropriate and practicable steps (40 CFR 23.70-77) be taken to minimize the potential adverse impacts of the discharge on the aquatic ecosystem?

B. **Determinations:**

1. **404(b)(1) Compliance/Noncompliance Review (40 CFR 230.12):**

- The discharge complies with the guidelines.
- The discharge complies with the guidelines, with the inclusion of the appropriate and practicable conditions listed in III.B.2.b.4 to minimize pollution or adverse effects to the affected ecosystem.

2. **Public interest determination:** The issuance of a Department of the Army permit (with special conditions), as prescribed by regulations published in 33 CFR Parts 320 to 330, and 40 CFR Part 230, would not be contrary to the public interest.

3. **Clean Air Act General Conformity Applicability:** The project emissions have been evaluated in Section 4.7 of this EIS The only pollutants for which San Diego County exceeds the NAAQS are O_3 .and CO. The county is classified as serious nonattainment for O_3 and moderate nonattainment for CO. Ozone is formed in the atmosphere by the reaction of VOCs, referred to as reactive organic gases (ROG),

and NO_x. These are known as the precursor air pollutants for emissions analysis. The threshold limit for VOCs (ROG) and NO_x is 50 tons per year. ROG and NO_x emissions for the combined projects (P-010 and P-030) under all alternatives would be less than 50 tons per year. The threshold value for CO is 100 tons per year. The CO emissions from the combined projects are well below this threshold for all alternatives. The construction emissions for each alternative would comprise less than one percent of the San Diego air basin emissions. Thus, the construction portions of the projects are exempted from general conformity requirements. A Record of Non-Applicability (RONA) is included in Appendix F

The operation of the stormwater management system pumps would be exempted from the general conformity requirements. This is due to the fact that the conformity rule exempts emissions from permitted sources, and also provides exemptions for emissions that occur during emergency situations (flooding).

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P.O BOX 532711
LOS ANGELES, CALIFORNIA 90053-2325
May 7, 1997

REPLY TO
ATTENTION OF:

Office of the Chief
Regulatory Branch

Commanding General
Marine Corps Base, Camp Pendleton
Attn: Mr. Lupe Armas
Box 555010
Camp Pendleton, California 92055

Dear Mr. Armas:

It has come to my attention that the Marine Corps is planning on adopting a modified version of Alternative 3 as the new preferred alternative for the Santa Margarita River Flood Control Project (MILCON P-010). This alternative would involve a levee which maintains minimum distances from the airfield along the length of MCAS Camp Pendleton, transitions sharply to run parallel to Vandegrift Blvd. downstream of the airfield, and bumps out to protect Sewage Treatment Plant #3 and the 22 Area.

The Corps of Engineers believes that Alternative 3 represents substantial effort on the part of the Marine Corps to avoid and minimize direct and indirect impacts to aquatic resources. We believe that of the alternatives analyzed to date, this alternative would represent the least environmentally damaging practicable alternative which would achieve the Marine Corps' stated goal of achieving 100-year flood protection for MCAS Camp Pendleton and the 22 Area. We have some outstanding questions and concerns regarding the proposed revision to the upstream end of this alternative, the upstream guide vane, and regarding temporary construction related impacts; however, we are confident that these issues can be addressed in the near future. Upon resolution of these issues, the remaining review and analysis required under NEPA and Section 404 should proceed expeditiously.

We support and applaud your efforts to "think outside the box" and come up with an innovative proposal which promises to achieve the necessary flood protection with minimal environmental impacts. If you have any questions, please contact me at (213) 452-3406 or Eric Stein of my staff at (213) 452-3415.

Sincerely,

Richard J. Schubel
Chief, Regulatory Branch

cf: USEPA; Attn: Mary Butterwick
USFWS; Attn: Doreen Stadtlander
RWQCB-San Diego; Attn: Greig Peters

Review by USACOE of Project Alternatives

Figure E-1

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APPENDIX F

APPENDIX F

AIR CONFORMITY ANALYSIS

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F.1 AIR CONFORMITY ANALYSIS

F.1.1 General Conformity Applicability

The EPA published the General Conformity Rule in the Federal Register on November 15, 1993. The EPA's general conformity rules apply primarily in areas of the county designated as "Nonattainment" for air quality purposes. The Clean Air Act (CAA), Section 176(c)(1) requires that all Federal actions conform to the State Implementation Plan (SIP). Any proposed action shall not:

- Cause or contribute to any new violation of any National Ambient Air Quality Standard (NAAQS) in any area;
- Increase the frequency or severity of any existing violation of any area; or
- Delay timely attainment of any required interim mission reduction or other milestone in any area.

In nonattainment and maintenance areas, conformity determinations are required for nearly all Federal and Federally-assisted actions having the potential to result in direct or indirect emissions equal to or exceeding the threshold emissions rates listed in Table F-1 (for nonattainment areas). If the total direct and indirect emissions from a proposed Federal action, after subtracting any exempted emissions or emissions that are presumed to conform, for a peak year of activity would not exceed the threshold annual emission rates for criteria pollutants, the Federal action would be deemed *de minimis* and exempted from the conformity requirements. However, before a proposed project can be declared de minimis and exempted from further conformity analyses/determination requirements, the project's estimated emissions of each pollutant of concern cannot equal or exceed 10 percent of the air quality control region's emission inventory for that type of pollutant. If the project's estimated emissions would equal or exceed the 10 percent amount, the project would be deemed a "regionally significant action", and would not qualify for an exemption. The proposed project must then undergo a complete conformity analysis.

The project emissions (tons per year) for each alternative are presented in Table F-2. The only pollutants for which San Diego County exceeds the NAAQS are O_3.and CO. The county is classified as serious nonattainment for O_3 and moderate nonattainment for CO. Ozone is formed in the atmosphere by the reaction of VOCs, referred to as reactive organic gases (ROG), and NO_x. These are known as the precursor air pollutants for emissions analysis. As shown in Table F-1, the threshold limit for VOCs (ROG) and NO_x is 50 tons per year. As shown in Table F-2, ROG and NO_x emissions for the combined projects (P-010 and P-030) under all alternatives would be less than 50 tons per year. The threshold value for CO is 100 tons per year. The CO emissions from the combined projects are well below this threshold for all alternatives (Table F-2). Also, the construction emissions, as discussed for each alternative, would comprise less than one percent of

Table F-1
De Minimis Thresholds in Nonattainment Areas

Criteria Pollutant	Degree of Nonattainment	Tons/year
Ozone (VOCs and No_x)	Serious	50
	Severe	25
	Extreme	10
	Other ozone nonattainment areas (outside of ozone transport region)	100
VOCs	Marginal/moderate nonattainment (within ozone transport region)	50
NO_x	Marginal/moderate nonattainment (within ozone transport region)	100
Carbon monoxide	All	100
Particulate matter (PM_{10})	Moderate	100
	Serious	70
Sulfur/nitrogen dioxide (SO_2/NO_2)	All	100
Lead (Pb)	All	25

Table F-2
Annual Construction Emissions for Each Project Alternative
(tons per year)

Alternative	CO	ROG	NO_x	SO_x	PM_{10}
3A	19.45	3.54	32.32	2.96	18.75
3B	19.45	3.54	32.32	2.96	18.75
3C	21.02	3.93	35.48	3.26	21.44
1A	24.33	4.37	39.05	3.65	24.22
1B	24.33	4.37	39.05	3.65	24.22
1C	24.75	4.42	39.30	3.65	26.61
2A	19.45	3.54	32.32	2.96	19.82
2B	19.45	3.54	32.32	2.96	19.82
2C	20.80	3.90	35.34	3.27	22.49

the San Diego air basin emissions. Thus, the construction portions of the projects are exempted from general conformity requirements. A Record of Non-Applicability (RONA) is included in Appendix F.

The operation of the stormwater management system pumps would be exempted from the general conformity requirements. This is due to the fact that the conformity rule exempts emissions from permitted sources, and also provides exemptions for emissions that occur during emergency situations (flooding).

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RECORD OF NON-APPLICABILITY

F.2 A RECORD OF NON-APPLICABILITY (RONA)

F.2.1 Decision Memorandum

Subj: RECORD OF NON-APPLICABILITY (RONA) FOR 2 PROPOSALS WITHIN MCB CAMP PENDLETON

1. Section 176(c) of the Clean Air Act [42 U.S.C. 7506(c)] requires federal agencies to demonstrate that proposed federal actions will not interfere with the attainment of air standards as contemplated by State Implementation Plans. Marine Corps Base (MCB) Camp Pendleton and Marine Corps Air Station (MCAS) propose several actions analyzed for environmental concerns in the Santa Margarita River Flood Control Project and Basilone Road Bridge Replacement Environmental Impact Statement. These same proposals were analyzed for their compliance with the General Conformity Rule in Appendix F of this EIS. This Decision Memorandum documents the Clean Air Act general conformity decisions regarding the actions proposed in the Environmental Impact Statement (EIS), and analyzed in the conformity analysis documents referenced above.

2. The EIS addresses actions proposed by MCB Camp Pendleton and MCAS Camp Pendleton. MCB Camp Pendleton is the USMC's only west coast military installation where a comprehensive air, sea, and ground assault training scenario can be executed. Facilities and operations in the southern portion of MCB Camp Pendleton adjacent to the Santa Margarita River are located in the 100-year floodplain for the river. To prevent future damage to property and disruption of essential operations, the MCB Camp Pendleton has proposed construction of a flood control project. The purpose of this project would be to protect USMC assets within the limits of the 100-year floodplain of the Santa Margarita River during a storm event of up to 100 years in magnitude. In addition, the temporary Basilone Road Bridge would be replaced to provide north-south access across the Santa Margarita River in the southeast portion of MCB Camp Pendleton. The bridge would need to be able to withstand a flood event of up to 100 years in magnitude. The EIS analyzes alternatives for protecting USMC assets within the limits of the 100-year floodplain and for replacing the temporary Basilone Road Bridge over the Santa Margarita River.

3. The EIS evaluates two proposal for MCB Camp Pendleton and MCAS Camp Pendleton: the Santa Margarita River Flood Control Project, (including a stormwater management system) (P-010) and the Basilone Road Bridge Replacement Project (P-030). A conformity analysis was conducted for the Preferred Action and eight alternatives to determine whether any of these alternatives would contribute a net air pollution emission increase in regions designated non-attainment for any criteria pollutant. A qualified consultant determined the air quality regions affected by the proposal, direct and indirect emissions from current activities (as a basis for comparing net emissions of proposed actions), and foreseeable emissions of proposed actions.

4. In each proposal a conformity determination required by Section 176(c) of the Clean Air Act was found to be not applicable due to either: 1) actions proposed being within regions attaining all air quality standards, 2) no net activity increases or emissions are being proposed, 3) increased emissions would fall below de minimis levels, and would not be regionally significant because they would not exceed 10% of the air quality regions' total emissions inventory for any pollutant.

UNITED STATES MARINE CORPS
MARINE CORPS BASE
BOX 555010
CAMP PENDLETON CALIFORNIA 92055-5010

IN REPLY REFER TO:
5090.6
ENVSEC/425
27 Jun 97

From: Commanding General, Marine Corps Base, Camp Pendleton
To: Commandant of the Marine Corps, Headquarters, U.S. Marine Corps, (LFL) (Attn: Jim Omans), 2 Navy Annex, Washington, D.C. 20380-1775

Subj: RECORD OF NON-APPLICABILITY FOR MILCON PROJECTS P-010 AND P-030

Ref: (a) Final Environmental Impact Statement, Santa Margarita River Flood Control Project, Milcon Project P-010, and Basilone Road Bridge Replacement, Milcon Project P-030, Marine Corps Base Camp Pendleton, California, dtd June, 1997

1. Pursuant to section 176(c) of the Federal Clean Air Act (CAA), as amended in 1990, the General Conformity Rule at 40 C.F.R. Parts 51 and 93; and the Department of the Navy (DoN) policy regarding compliance with the requirements of the General Conformity rule, the DoN conducted a conformity applicability analysis of the air emissions associated with the subject military construction (MILCON) projects.

2. The conformity applicability analysis for the subject projects establishes that the projected air emissions of the criteria pollutants of concern associated with the actions will be below the applicable de minimis thresholds and will not be regionally significant. Therefore, the subject projects are presumed to be exempt from full conformity determinations under the General Conformity Rule, 40 C.F.R. sections 93.153(c)(1) and (i). Sections 3.7, 4.7, and 5.2.5 of reference (a) provide summaries of the assumptions, methodologies, and calculations that support this determination.

3. This conformity review concludes that the total project emissions of criteria pollutants resulting from the proposed Santa Margarita River Flood Control Project and Basilone Bridge Replacement at the Marine Corps Base Camp Pendleton, California, will not exceed the de minimis thresholds specified in the Environmental Protection Agency regulations.

C. W. REINKE

F.3 CALCULATIONS

F.3.1 Alternative 3A - Emission Calculation

1. Material Delivery Trips from Oceanside to Camp Pendleton (40 mi round trip)

	Trips	Material
	540	Rock rivetment for levee
	1,110	Soil cement for levee
	460	Concrete for floodwall
	50	Steel piles for floodwall
	10	Floodwall steel
	3,600	Aggregate base for levee road
	900	Bridge slope protection
	500	Concrete for bridge
	20	Bridge foundation piling
	40	Bridge reinforcing steel
	180	Aggregate base for bridge
Total	12,270	for 2 years (360 construction days)

$$\frac{12220 \ \textit{trips}}{360 \ \textit{days}} = 34 \ \textit{trips/day}$$

Exhaust Emissions for Delivery Vehicles

Emission Factors: g/mi for year 1999, speed 40 mph

CO = 7.57 ROG = 0.90 $No_x = 4.55$ $PM_{10} = 0.465$

$$CO: \frac{7.57 \ g/mi \ x \ 34 \ trips \ x \ 40 \ mi/trips}{453.6 \ g/lb} = 22.70 \ lbs/day$$

$$ROG: \frac{0.90 \ g/mi \ x \ 34 \ trips \ x \ 40 \ mi/trip}{453.6 \ g/lb} = 2.70 \ lbs/day$$

$$NO_x: \frac{4.55 \ g/mi \ x \ 34 \ trips \ x \ 40 \ mi/trip}{453.6 \ g/lb} = 13.64 \ lbs/day$$

$$PM_{10}: \frac{0.465 \ g/mi \ x \ 34 \ trips \ x \ 40 \ mi/trip}{453.6 \ g/lb} = 1.39 \ lbs/day$$

2. Onbase haul trucks: Fill material from Area 22

990 trips over 360 days, 12 miles round trip,

average speed 30 mph; $\frac{990 \ trips}{360 days} = 2.75 \approx 3 \ trips/day$

Emission factors for 1999: g/mi

CO = 9.58 ROG = 1.21 $NO_X = 4.45$ $PM_{10} = 0.465$

$$CO: \frac{3 \ trips/day \ x \ 12 \ mi \ x \ 9.58 \ g/mi}{453.6 \ g/lb} = 0.76 \ lbs/day$$

$$ROG: \frac{3\ trips/day\ x\ 12\ mi\ x\ 1.21\ g/mi}{453.6\ g/lb} = 0.10\ lbs/day$$

$$NO_x: \frac{3\ trips/day\ x\ 12\ mi\ x\ 4.45\ g/mi}{453.6\ g/lb} = 0.35\ lbs/day$$

$$PM_{10}: \frac{3\ trips/day\ x\ 12\ mi\ x\ 0.465\ g/mi}{453.6\ g/lb} = 0.04\ lbs/day$$

3. Miscellaneous Construction Equipment

20 pieces, 75 Brake Horsepower-Hour, 8-hour workday

20 x 75 x 8 = 12,000 Brake Horsepower/day

Emission factors: pounds/Horsepower-Hour

CO = 0.0019 ROG = 0.0006 NO_X = 0.0086 SO_X = 0.0006 PM_{10} = 0.0003

$$CO = 0.0019\ x\ 12{,}000\ BHP/day = 22.80\ lbs/day$$

$$ROG = 0.006\ x\ 12{,}000\ BHP/day = 7.20\ lbs/day$$

$$NO_x = 0.0086\ x\ 12{,}000\ BHP/day = 103.20\ lbs/day$$

$$SO_x = 0.0006\ x\ 12{,}000\ BHP/day = 7.20\ lbs/day$$

$$PM_{10} = 0.0003\ x\ 12{,}000\ BHP/day = 3.60\ lbs/day$$

4. Miscellaneous Construction Equipment plus Onbase Haul Trucks

$$CO: \; 22.80 \; lbs/day + 0.76 \; lbs/day = 23.56 \; lbs/day$$

$$ROG: \; 7.20 \; lbs/day + 0.10 \; lbs/day = 7.30 \; lbs/day$$

$$NO_x: \; 103.20 \; lbs/day + 0.35 \; lbs/day = 103.55 \; lbs/day$$

$$PM_{10}: \; 3.60 \; lbs/day + 0.04 \; lbs/day = 3.64 \; lbs/day$$

$$SO_x: \; 7.20 \; lbs/day + -- \; lbs/day = 7.20 \; lbs/day$$

5. Scraper Exhaust Emissions

7 Scrapers used 8 hours/day

Emission factors: lbs/hour

$CO = 1.257$ $ROG = 0.425$ $NO_X = 3.840$ $SO_X = 0.433$ $PM_{10} = 0.40$

Emissions: lbs/day

$$CO: \; 7 \; scrapers \; x \; 8 \; hours/day \; x \; 1.257 \; lbs/hr = 70.39 \; lbs/day$$

$$ROG: \; 7 \; scrapers \; x \; 8 \; hours/day \; x \; 0.425 \; lbs/hr = 23.80 \; lbs/day$$

$$NO_x: \; 7 \; scrapers \; x \; 8 \; hours/day \; x \; 3.840 \; lbs/hr = 215.04 \; lbs/day$$

$$SO_x: \; 7 \; scrapers \; x \; 8 \; hours/day \; x \; 0.433 \; lbs/hr = 24.25 \; lbs/day$$

$$PM_{10}: \; 7 \; scrapers \; x \; 8 \; hours/day \; x \; 0.406 \; lbs/hr = 22.74 \; lbs/day$$

6. Bulldozer Exhaust Emissions

2 bulldozers used 8 hours/day

Emission factors: lbs/hour

$CO = 3.59$ $ROG = 0.218$ $NO_X = 1.269$ $SO_X = 0.090$ $PM_{10} = 0.136$

Emissions: lbs/day

CO: 2 *bulldozers x* 8 *hrs/day x* 3.59 *lbs/hr* = 57.44 *lbs/day*

ROG: 2 *bulldozers x* 8 *hrs/day x* 0.218 *lbs/hr* = 3.49 *lbs/day*

NO_x: 2 *bulldozers x* 8 *hrs/day x* 1.269 *lbs/hr* = 20.30 *lbs/day*

SO_x: 2 *bulldozers x* 8 *hrs/day x* 0.090 *lbs/hr* = 1.44 *lbs/day*

PM_{10}: 2 *bulldozers x* 8 *hrs/day x* 0.136 *lbs/hr* = 2.18 *lbs/day*

7. Construction Worker Commute Vehicles

150 worker vehicles Round trip 50 miles

Emission factors for 1999: g/mi; 45 mph average speed

$CO = 2.55 \quad ROG = 0.13 \quad NO_X = 0.40 \quad PM_{10} = 0.105$

Emissions: lbs/day

$$CO = \frac{2.55\ g/mi\ x\ 50\ mi/day\ x\ 150\ veh}{453.6\ g/lb} = 42.16\ lbs/day$$

$$ROG = \frac{0.13\ g/mi\ x\ 50\ mi/day\ x\ 150\ veh}{453.6\ g/lb} = 2.15\ lbs/day$$

$$NO_x = \frac{0.40\ g/mi\ x\ 50\ mi/day\ x\ 150\ veh}{453.6\ g/lb} = 6.61\ lbs/day$$

$$PM_{10} = \frac{0.105\ g/mi\ x\ 50\ mi/day\ x\ 150\ veh}{453.6\ g/lb} = 1.74\ lbs/day$$

8. PM_{10} fugitive emission resulting from excavation, dumping and placement of soil.

Total soil disturbed 763,920 yd^3 over 2 year period

Soil density assumed to be 1.5 tons/yd^3

Wt. Of soil processed each day

$$\frac{763{,}920\ yd^7\ x\ 1.5\ ton/yd^3}{360\ days} = 3{,}183\ tons/day$$

Emission factors for total suspended particulates (TSP)

Excavation:	0.058 lbs/ton
Dumping:	0.002 lbs/ton
Placement:	0.012 lbs/ton

TSP Emissions

Excavation: $3{,}183\ tons/day \times 0.058\ lbs/ton = 184.61\ lbs/day$

Dumping: $3{,}183\ tons/day \times 0.002\ lbs/ton = 6.37\ lbs/day$

Placement: $3{,}183\ tons/day \times 0.012\ lbs/ton = 38.20\ lbs/day$

$$Total = 229.18\ lbs/day$$

Assume PM_{10} fraction of TSP = 0.25

$$PM_{10} = 0.25 \times TSP = 0.25 \times 229.18\ lbs/day = 57.30\ lbs/day$$

9. PM_{10} Resulting from disturbed acreage

Total acres disturbed = 112 acres over 2 year period

Assume that 10 percent of the total acreage is disturbed each day

$$PM_{10}\ emission\ factor = 26.4\ lbs/acre$$

$$112 \text{ acres} \times 0.10 = 11.2 \text{ acres disturbed/day}$$

$$112 \text{ acres/day} \times 26.4 \text{ lbs/acre} = 295.68 \text{ lbs of } PM_{10}\text{/day}$$

10. Total PM_{10} fugitive emissions with water application

Total PM_{10} emissions (without watering) =

$$295.68 \text{ lbs/day} + 57.30 \text{ lbs/day} = 352.98 \text{ lbs/day}$$

Application of water will reduce PM_{10} emission by 50%

$$PM_{10} \text{ emissions with watering} = 352.98 \text{ lbs/day} \times 0.5 = 176.49 \text{ lbs/day}$$

F.3.2 Alternative 3B - Emission Calculation

Emissions for this alternative are the same as shown for Alternative 3 A.

F.3.3 Alternative 3C - Emission Calculations

1. Material Delivery Trips from Oceanside to Camp Pendleton (40 mi round trip)

An additional 3,990 trips to deliver material for the bridge over that required in Alternative 3A/

Total Trips (over 2 year period)

$$12{,}270 + 3{,}990 = 16260 \text{ trips}$$

Exhaust emissions are calculated by scaling emissions from Alternative 3A.

$$Trips/day = \frac{16{,}260\ trips}{360\ day} = 45\ trips/day$$

$$\frac{45\ trips\ (3C)}{34\ trips\ (3A)} = 1.3235$$

Exhaust Emissions for Delivery Vehicles

$$CO\text{:}\ \ 22.70\ lbs/day\ x\ 1.3235 = 30.04\ lbs/day$$

$$ROG\text{:}\ \ 2.70\ lbs/day\ x\ 1.3235 = 3.57\ lbs/day$$

$$NO_x\text{:}\ \ 13.64\ lbs/day\ x\ 1.3235 = 18.05\ lbs/day$$

$$PM_{10}\text{:}\ \ 1.39\ lbs/day\ x\ 1.3235 = 1.84\ lbs/day$$

2. Onbase haul truck emissions same as in Alternative 3A.

3. Miscellaneous Construction Equipment

   Emissions from the miscellaneous construction equipment for this alternative are the same as in Alternative 3A.

4. Miscellaneous construction equipment plus onbase haul truck emissions are the same as in Alternative 3A.

5. Scraper Exhaust Emissions

These emissions are calculated by scaling emissions from Alternative 3A.

$$\frac{8\ scrapers\ (3C)}{7\ scrapers\ (3A)} = 1.1429$$

$$CO = 70.39\ lbs/day\ x\ 1.1429 = 80.45\ lbs/day$$

$$ROG = 23.80\ lbs/day\ x\ 1.1429 = 27.20\ lbs/day$$

$$NO_x = 215.04\ lbs/day\ x\ 1.1429 = 245.76\ lbs/day$$

$$SO_x = 24.25\ lbs/day\ x\ 1.1429 = 27.71\ lbs/day$$

$$PM_{10} = 22.74\ lbs/day\ x\ 1.1429 = 25.99\ lbs/day$$

6. Bulldozer Exhaust Emissions

2 bulldozers, 8 hours per day

Emissions are the same as in Alternative 3A.

7. Construction Worker Commute Vehicle

Emissions are the same as calculated for Alternative 3A.

8. PM_{10} fugitive emissions resulting from excavations, dumping and placement of soil.

Total soil disturbed 793,433 yd^3 over 2 year period.

Such density assumed to be 1.5 tons/day

Wt. of soil processed each day.

$$\frac{793{,}433\ yd^3\ x\ 1.5\ ton/yd^3}{360\ days} = 3{,}306\ tons/day$$

Emission factors for TSP are the same as used in Alternative 3A.

TSP Emissions

Excavation: $3{,}306\ tons/day\ x\ 0.058\ lbs/ton\ =\ 191.75\ lbs/day$

Dumping: $3{,}306\ tons/day\ x\ 0.002\ lbs/ton\ =\ 6.61\ lbs/day$

Placement: $3{,}306\ tons/day\ x\ 0.012\ lbs/ton\ =\ 39.67\ lbs/day$

$Total\ =\ 238.03\ lbs/day$

$$PM_{10}\ =\ 0.25\ x\ TSP\ =\ 0.25\ x\ 238.03\ =\ 59.51\ lbs/day$$

9. PM_{10} resulting from disturbed acreage.

Total acres disturbed = 131 acres.

$$131 \; acres \times 0.10 = 13.1 \; acres/day$$

PM_{10} emission factor 26.4 lbs/acre

$$13.1 \; acre/day \times 26.4 \; lbs/acre = 345.84 \; lbs \; PM_{10}/day$$

10. Total PM_{10} fugitive emissions with water application.

Total PM_{10} emissions (without~ watering)

$$345.84 \; lbs/day + 59.51 \; lbs/day = 405.35 \; lbs/day$$

PM_{10} emissions with watering

$$405.35 \; lbs/day \times 0.5 = 202.68 \; lbs/day$$

F.3.4 Alternative 1A - Emission Calculations

1. Material Delivery Trips from Oceanside to Camp Pendleton (40 mi round trip)

Trips	Material
8,100	Rock slope protection
1,500	Soil cement for levee
900	Bridge slope protection
500	Concrete for bridge

	Trips (cont.)	**Material** (cont.)
	20	Bridge foundation pilings
	40	Bridge reinforcing steel
	4,000	Aggregate base for levee road
	180	Aggregate for bridge
Total	15,240	for 2 years (360 construction days)

$$\frac{15{,}240\ trips}{360\ days} = 42\ trips/day$$

Exhaust emissions are calculated by scaling emission from Alternative 3A.

$$\frac{42\ trips\ (2A)}{34\ trips\ (1A)} = 1.2353$$

$$CO\text{:}\ 22.70\ lbs/day\ x\ 1.2352 = 28.04\ lbs/day$$

$$ROG\text{:}\ 2.70\ lbs/day\ x\ 1.2352 = 3.34\ lbs/day$$

$$NO_x\text{:}\ 13.64\ lbs/day\ x\ 1.2352 = 16.85\ lbs/day$$

$$PM_{10}\text{:}\ 1.39\ lbs/day\ x\ 1.2352 = 1.72\ lbs/day$$

2. Onbase haul truck emissions are the same as in Alternative 3A.

3. Miscellaneous Construction Equipment

Emissions from the miscellaneous construction equipment for this alternative are the same as Alternative 3A.

4. Miscellaneous construction equipment plus onbase haul truck emissions are the same as Alternative 3A.

5. Scraper Exhaust Emissions

These emissions are calculated by scaling emissions from Alternative 3A.

$$\frac{9\ scrapers\ (1A)}{7\ scrapers\ (3A)} = 1.2857$$

$$CO\text{:}\ \ 70.39\ lbs/day\ x\ 1.2857\ =\ 90.50\ lbs/day$$

$$ROG\text{:}\ \ 23.80\ lbs/day\ x\ 1.2857\ =\ 30.60\ lbs/day$$

$$NO_x\text{:}\ \ 215.04\ lbs/day\ x\ 1.2857\ =\ 276.48\ lbs/day$$

$$SO_x\text{:}\ \ 24.25\ lbs/day\ x\ 1.2857\ =\ 31.18\ lbs/day$$

$$PM_{10}\text{:}\ \ 22.74\ lbs/day\ x\ 1.2857\ =\ 29.24\ lbs/day$$

6. Bulldozer Exhaust Emission

These emissions are calculated by scaling emissions from Alternative 3A.

$$\frac{3\ bulldozers\ (1A)}{2\ bulldozers\ (3A)} = 1.5$$

$$CO: \; 57.44 \; lbs/day \times 1.5 = 86.16 \; lbs/day$$

$$ROG: \; 3.49 \; lbs/day \times 1.5 = 5.24 \; lbs/day$$

$$NO_x: \; 20.30 \; lbs/day \times 1.5 = 30.45 \; lbs/day$$

$$SO_x: \; 1.44 \; lbs/day \times 1.5 = 2.16 \; lbs/day$$

$$PM_{10}: \; 2.18 \; lbs/day \times 1.5 = 3.27 \; lbs/day$$

7. Construction Worker Commute Vehicle

Emissions are the same as calculated for Alternative 3A.

8. PM_{10} fugitive emissions resulting from excavation, dumping, and placement of soil.

Total soil disturbed: 1,044,000 yd^3

Soil density assumed to be 1.5 ton/yd^3

$$\frac{1{,}044{,}000 \; yd^3 \times 1.5 \; ton/yd^3}{360 \; days} = 4{,}350 \; tons/day$$

TSP Emissions

Excavation: $4{,}350\ tons/day\ x\ 0.058\ lbs.ton\ =\ 252.30\ lbs/day$

Dumping: $4{,}350\ tons/day\ x\ 0.002\ lbs.ton\ =\ 8.70\ lbs/day$

Placement: $4{,}350\ tons/day\ x\ 0.012\ lbs.ton\ =\ 52.20\ lbs/day$

$$PM_{10}\ =\ 0.25\ x\ TSP\ =\ 0.25\ x\ 313.20\ lbs/day\ =\ 78.30 lbs/day$$

9. PM_{10} resulting from disturbed acreage

Total acres disturbed: 122 acres

122 acres x 0.1 = 12.2 acres/day

PM_{10} emission factor: 26.4 lbs/acre

12.2 acres/day x 26.4 lbs/acre = 322.08 lbs PM_{10}/day

10. Total PM_{10} fugitive emissions with water application

Total PM_{10} emissions (without watering)

$$322.08\ lbs/day\ +\ 78.30\ lbs/day\ =\ 400.38\ lbs/day$$

PM_{10} emissions with watering

$$400.38\ lbs/day\ x\ 0.5\ =\ 200.19\ lbs/day$$

F.3.5 Alternative 1B - Emission Calculations

Emissions for this alternative are the same as shown for Alternative 1A.

F.3.6 Alternative 1C - Emission Calculations

1. Material Delivery Trips from Oceanside to Camp Pendleton (40 mi round trip)

An additional 2,409 trips to deliver material for the bridge over that required in Alternative 1A.

Total Trips (over 2 year period)

$$15{,}240 + 2{,}409 = 17{,}649 \ \mathit{trips}$$

$$\mathit{Trips/day} = \frac{17{,}649}{360} = 49 \ \mathit{trips/day}$$

Exhaust emissions are calculated by scaling emissions from Alternative 3A.

$$\frac{49 \ \mathit{trips} \ (1C)}{34 \ \mathit{trips} \ (3A)} = 1.4412$$

Exhaust emissions for delivery vehicles

$$CO\text{: } 22.70 \ \mathit{lbs/day} \times 1.4412 = 32.71 \ \mathit{lbs/day}$$

$$ROG\text{: } 2.70 \ \mathit{lbs/day} \times 1.4412 = 3.89 \ \mathit{lbs/day}$$

$$PM_{10}\text{: } 1.39 \ \mathit{lbs/day} \times 1.4412 = 2.00 \ \mathit{lbs/day}$$

$$NO_x\text{: } 13.64 \ \mathit{lbs/day} \times 1.4412 = 19.66 \ \mathit{lbs/day}$$

2. Onbase haul truck emissions same as in Alternative 1 A.

3. Miscellaneous Construction Equipment

   Emissions from the miscellaneous construction equipment for this alternative are the same as Alternative 1A.

4. Miscellaneous construction equipment plus onbase haul truck emissions are the same as Alternative 1A.

5. Scraper Exhaust Emissions

   The scraper emissions for this alternative are the same as those in Alternative 1A.

6. Bulldozer Exhaust Emission

   The bulldozer emissions for this alternative are the same as those in Alternative 1A.

7. Construction Worker Commute Vehicles

   Emissions are the same as calculated for Alternative 3A.

8. PM_{10} fugitive emissions resulting from excavation, dumping, and placement of soil.

   Total soil disturbed: 1,073,433 yd^3

   Soil density assumed to be 1.5 $tons/yd^3$

$$\frac{1{,}073{,}433\ yd^3\ x\ 1.5\ tons/yd^3}{360\ days} = 4{,}473\ tons/day$$

TSP Emissions

Excavation: $4{,}473\ tons/day\ x\ 0.058\ lbs/ton = 259.43\ tons/day$

Dumping: $4{,}473\ tons/day\ x\ 0.002\ lbs/ton = 8.95\ tons/day$

Placement: $4{,}473\ tons/day\ x\ 0.012\ lbs/ton = 53.68\ tons/day$

$$PM_{10} = 0.25\ x\ TSP = 0.25\ x\ 322.06\ tons/day = 80.52 lbs/day$$

9. PM_{10} resulting from disturbed acreage.

Total acres disturbed: 141 acres

$$141\ acres/day\ x\ 0.1 = 14.1\ acres/day$$

PM_{10} emission factor: 26.4 lbs/acre

$$141.1\ acres/day\ x\ 26.4\ lbs/acre = 372.24\ lbs\ PM_{10}/day$$

10. Total PM_{10} fugitive emissions with water application.

Total PM_{10} emissions (without watering)

$$372.24\ lbs/day + 80.52\ labs/day = 452.76\ lbs/day$$

PM_{10} emissions with watering

$$452.76\ lbs/day\ x\ 0.5 = 226.38\ lbs/day$$

F.3.7 Alternative 2A - Emission Calculations

1. Material Delivery Trips from Oceanside to Camp Pendleton (40 mi round trip)

	Trips	Material
	5,000	Levee/spur dikes rock slope protection
	1,700	Concrete for levee/spur dike construction
	900	Bridge slope protection
	500	Concrete for bridge construction
	20	Bridge foundation pilings
	40	Bridge reinforcing steel
	4,000	Aggregate for levee road
	180	Aggregate for bridge
Total	12,340	for 2 years (360 construction days)

$$\frac{12{,}340\ trips}{360\ days} = 34\ trips/day$$

Number of trips per day is the same as in Alternative 3A. Therefore, exhaust emissions are the same as in Alternative 3A.

2. Onbase haul truck emissions are the same as in Alternative 3A.

3. Miscellaneous Construction Equipment

   Emissions from miscellaneous construction equipment for this alternative are the same as Alternative 3A.

4. Miscellaneous construction equipment plus onbase haul truck emissions are the same as Alternative 3A.

5. Scraper Exhaust Emission

   The scraper emissions for this alternative are the same as those in Alternative 3A.

6. Bulldozer Exhaust Emissions

   The bulldozer emissions for this alternative as the same as those in Alternative 3A.

7. Construction Worker Commute Vehicles

   Emissions are the same as calculated for Alternative 3A.

8. PM_{10} fugitive emissions resulting from excavations, dumping, and placement.

   The volume and tonnage of the soil disturbed for this alternative are the same as in Alternative 3A. Therefore, PM_{10} emissions are the same, i.e. 57.30 lbs.

9. PM_{10} resulting from disturbed acreage

Total acres disturbed: 121 acres

$$121 \ acres \ x \ 0.1 \ = \ 12.1 \ acres/day$$

PM_{10} emission factor 26.4 lbs/acre

$$12.1 \ acres/day \ x \ 26.4 \ lbs/acre \ = \ 319.44 \ lbs \ PM_{10}/day$$

10. Total PM_{10} emission with water application.

Total PM_{10} emission (without watering)

$$319.44 \ lbs/day \ + \ 57.30 \ lbs/day \ = \ 376.74 \ lbs/day$$

PM_{10} emissions with watering

$$376.74 \ lbs/day \ x \ 0.5 \ = \ 188.37 \ lbs/day$$

F.3.8 Alternative 2B - Emission Calculations

Emissions for this alternative are the same as shown for Alternative 2A.

F.3.9 Alternative 2C - Emission Calculations

1. Material Delivery Trips from Oceanside to Camp Pendleton (40 mi round trip)

   An additional 2409 trips to deliver material for the bridge over that required in Alternative 2A.

Total Trips (over 2 year period)

$$12{,}340 + 2{,}409 = 12{,}749 \ trips$$

$$Trips \ per \ day = \frac{14{,}749}{360} = 41 \ trips/day$$

Exhaust emissions are calculated by scaling emissions from Alternative 3A.

$$\frac{41 \ trips \ (2C)}{34 \ trips \ (3A)} = 1.2059$$

Exhaust Emission for Delivery Vehicles

$$CO\text{:} \ \ 22.70 \ lbs/day \ x \ 1.2059 = 27.37 \ lbs/day$$

$$ROG\text{:} \ \ 2.70 \ lbs/day \ x \ 1.2059 = 3.26 \ lbs/day$$

$$NO_x\text{:} \ \ 13.64 \ lbs/day \ x \ 1.2059 = 16.45 \ lbs/day$$

$$PM_{10}\text{:} \ \ 1.39 \ lbs/day \ x \ 1.2059 = 1.68 \ lbs/day$$

2. Onbase haul truck emission.

Total trips 1,100 from Area 22.

Exhaust emission are calculated by scaling emissions from Alternative 1A.

$$\frac{1{,}100 \ trips \ (2C)}{900 \ trips \ (3A)} = 1.2222$$

Exhaust Emissions

$$CO\text{:} \ \ 0.76 \ lbs/day \ x \ 1.2222 = 0.93 \ lbs/day$$

$$ROG\text{:} \ \ 0.10 \ lbs/day \ x \ 1.2222 = 0.12 \ lbs/day$$

$$NO_x\text{:} \ \ 0.35 \ lbs/day \ x \ 1.2222 = 0.43 \ lbs/day$$

$$PM_{10}\text{:} \ \ 0.04 \ lbs/day \ x \ 1.2222 = 0.05 \ lbs/day$$

3. Miscellaneous Construction Equipment

Emissions from the miscellaneous construction equipment for this alternative are the same as Alternative 3A.

4. Miscellaneous construction equipment plus onbase haul trucks.

$$CO\text{:} \ \ 22.80 \ lbs/day + 0.93 \ lbs/day = 23.73 \ lbs/day$$

$$ROG\text{:} \ \ 7.20 \ lbs/day + 0.12 \ lbs/day = 7.32 \ lbs/day$$

$$NO_x\text{:} \ \ 103.20 \ lbs/day + 0.43 \ lbs/day = 103.63 \ lbs/day$$

$$SO_x\text{:} \ \ 7.20 \ lbs/day + -- = 7.20 \ lbs/day$$

$$PM_{10}\text{:} \ \ 3.60 \ lbs/day + 0.05 \ lbs/day = 3.65 \ lbs/day$$

5. Scraper Exhaust Emissions

The scraper exhaust emissions for this alternative are the same as those in Alternative 3C.

6. Bulldozer Exhaust Emissions

The bulldozer emissions for this alternative are the same as those in Alternative 3C.

7. Construction Worker Commute Vehicles

Emissions are the same as calculated for Alternative 3A.

8. PM_{10} fugitive emissions resulting from excavation, dumping, and placement of soil.

Total soil disturbed; 794,433 yd^3

Soil density assumed to be 1.5 ton/yd^3

Wt of soil process each construction day

$$\frac{794{,}433\ yd^3\ x\ 1.5\ tons/yd^3}{360\ days} = 3{,}310\ tons/day$$

Emission factors for TSP are the same as used in Alternative 1A.

TSP Emissions

Excavation: $3{,}310\ tons/day\ x\ 0.058\ lbs/ton = 191.98\ tons/day$

Dumping: $3{,}310\ tons/day\ x\ 0.002\ lbs/ton = 6.62\ tons/day$

Placement: $3{,}310\ tons/day\ x\ 0.012\ lbs/ton = 39.72\ tons/day$

$$PM_{10} = 0.25 \times TSP = 0.25 \times 238.32 \ tons/day = 59.58 \ lbs/day$$

9. PM_{10} resulting from disturbed acreage.

Total acres disturbed: 140 acres

$$140 \ acres \times 0.10 = 14.0 \ acres/day$$

PM_{10} emission factors: 26.4 lbs/acre

$$14.0 \ acres/day \times 26.4 \ lbs/acre = 369.60 \ lbs \ PM_{10}/day$$

10. Total PM_{10} fugitive emission with water applications

Total PM_{10} emission (without watering)

$$369.60 \ lbs/day + 59.58 \ lbs/day = 429.18 \ lbs/day$$

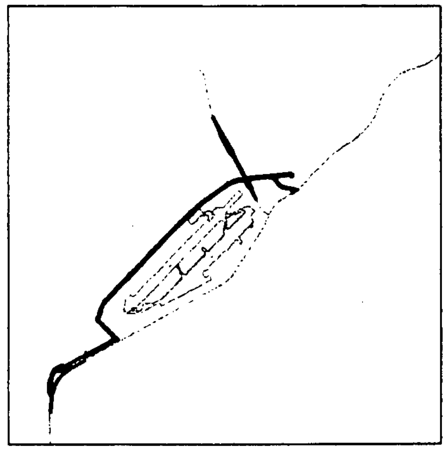
PM_{10} emission with watering

$$429.18 \ lbs/day \times 0.50 = 214.59 \ lbs/day$$

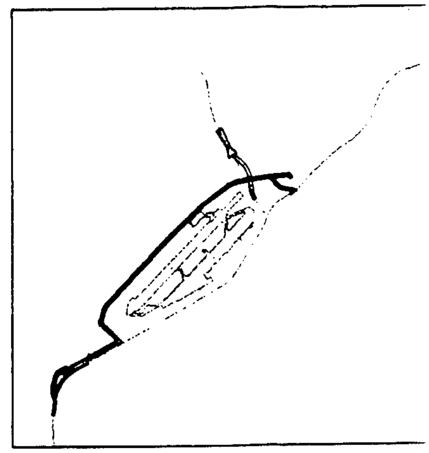
STUDY GUIDE

STUDY-GD.DWG 6-10-97

1



Alternative 3A



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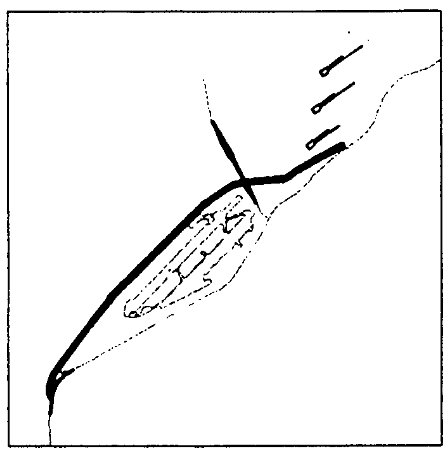

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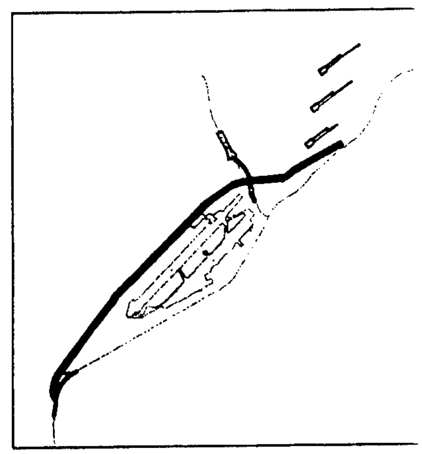

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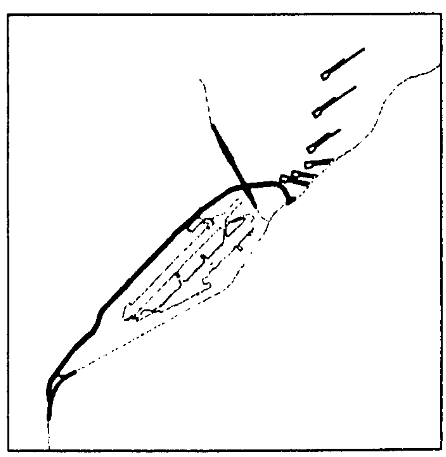

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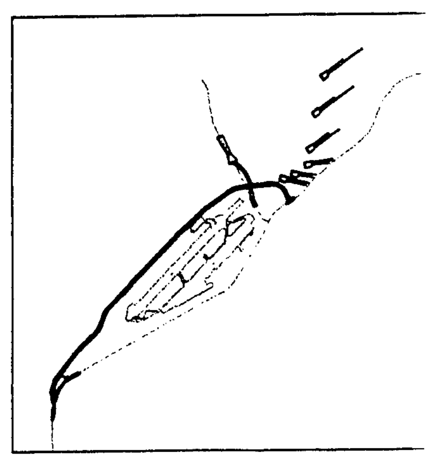

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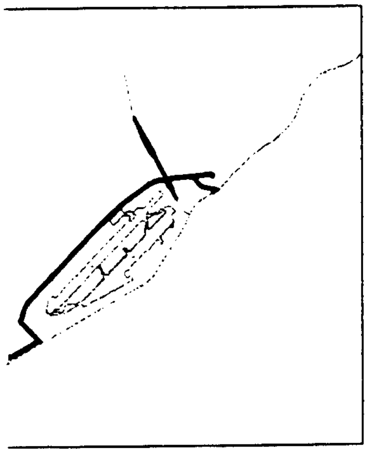

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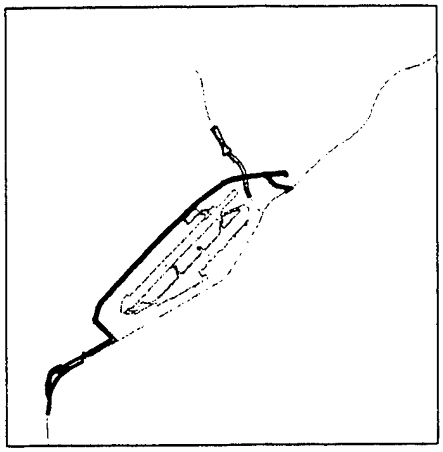

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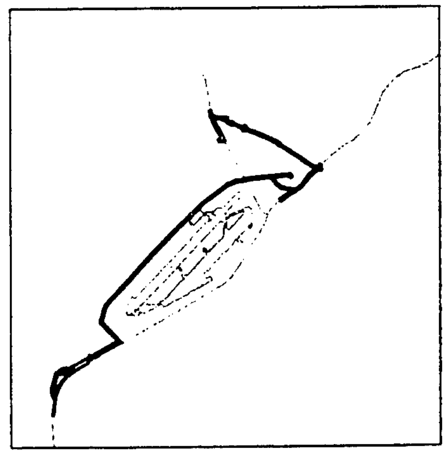

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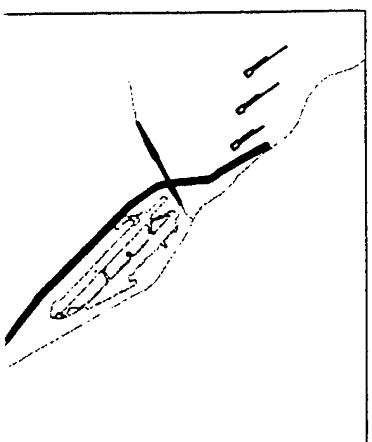

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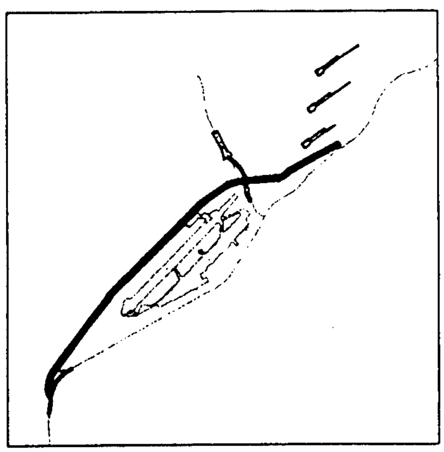

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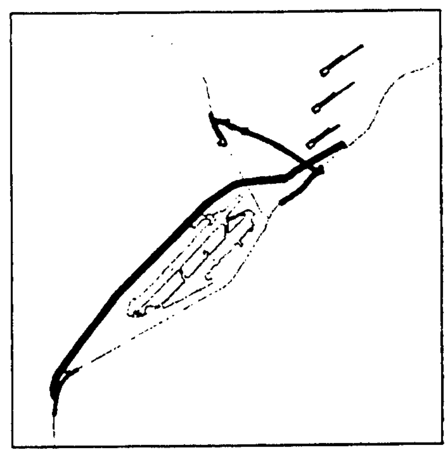

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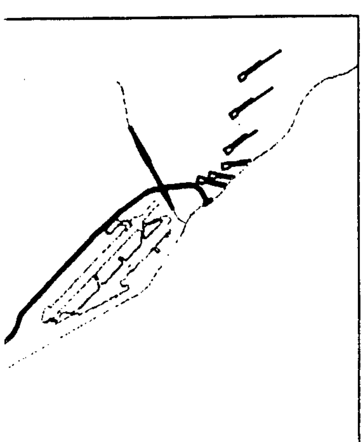

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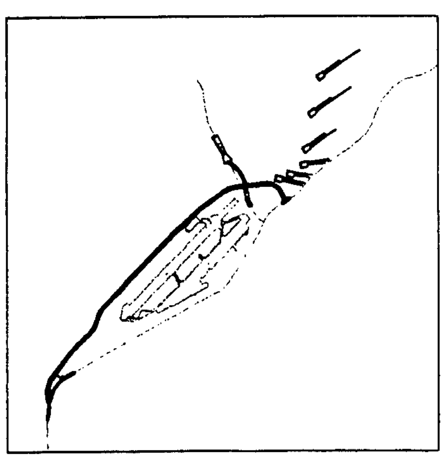

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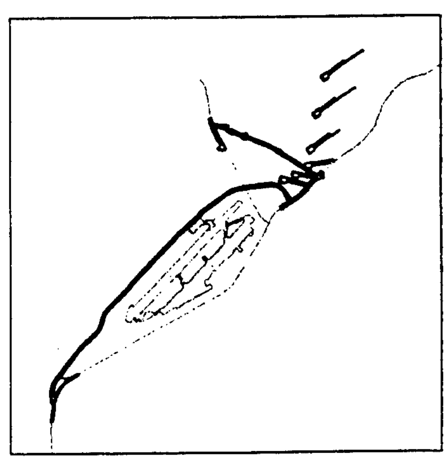

Alternative 2C